ELECTRICAL SOUTH

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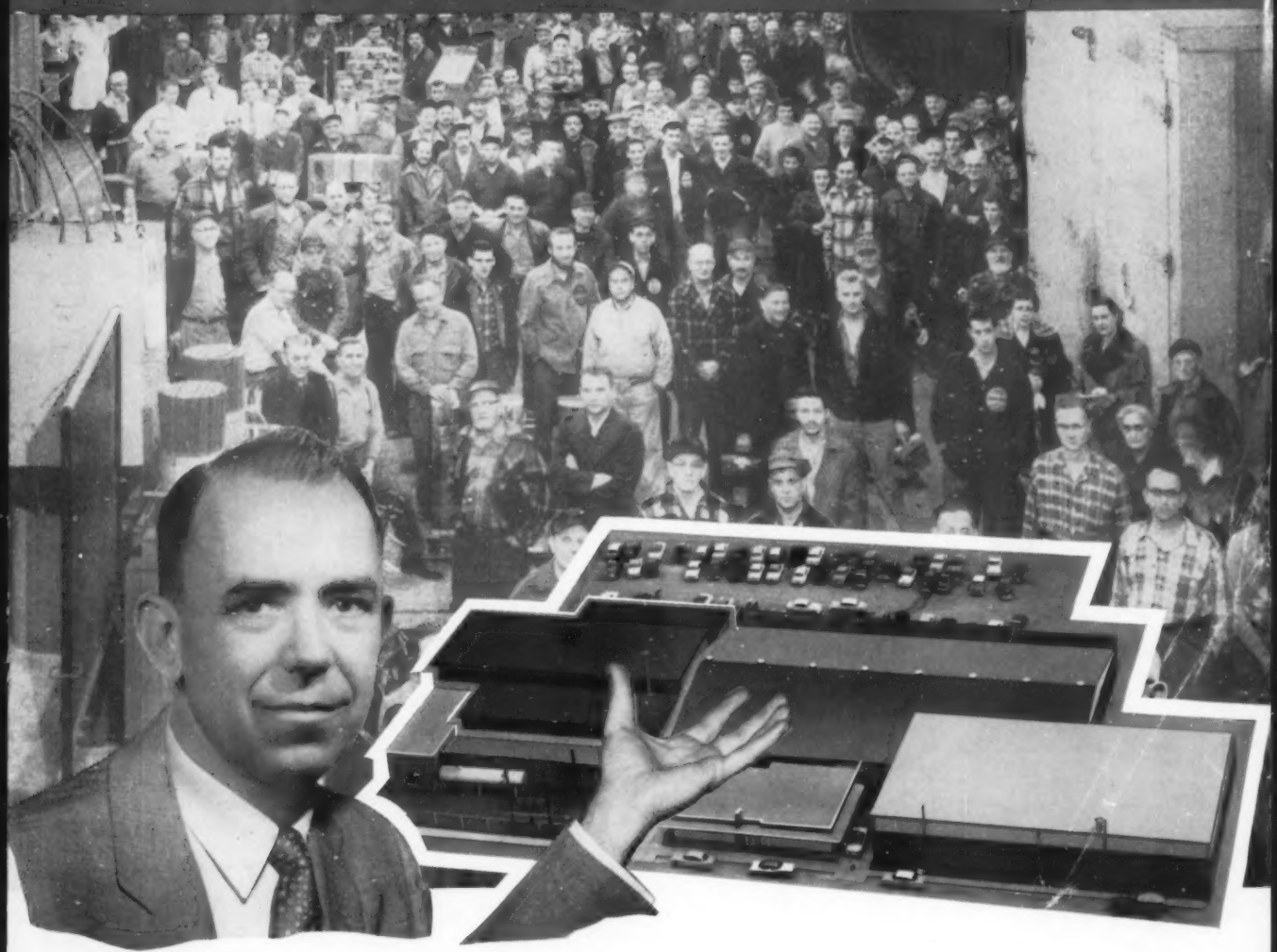
How southern utility companies are meeting load growth problems

NOVEMBER, 1957



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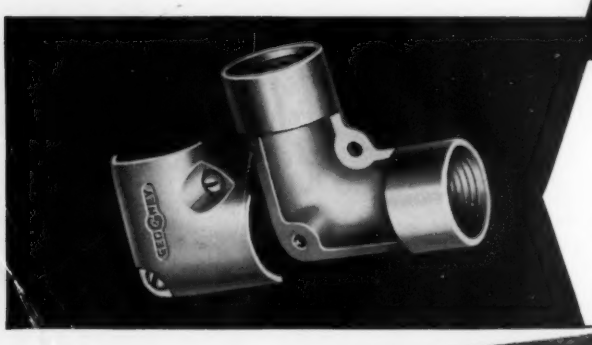

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Volume 37 **Number 11**

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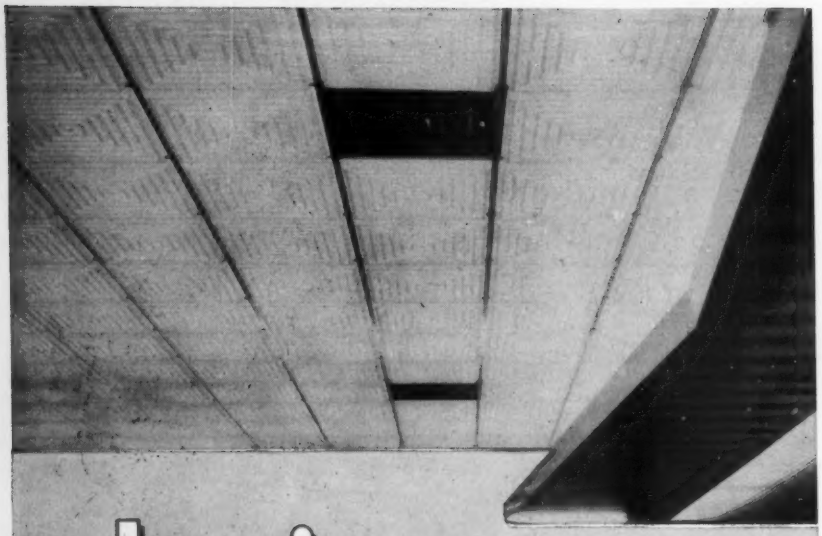

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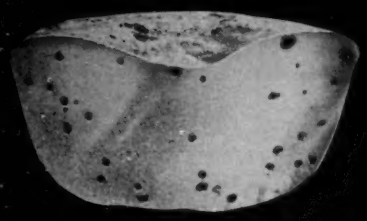

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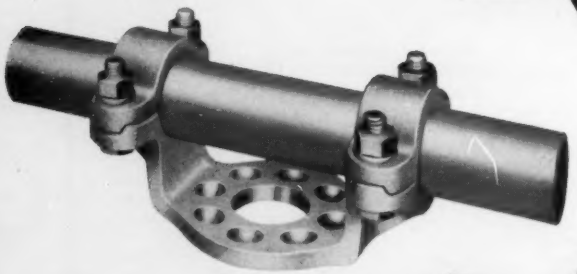

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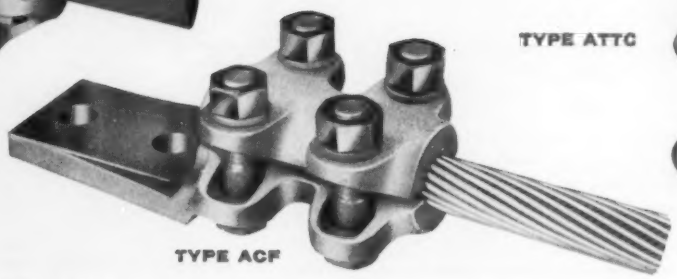

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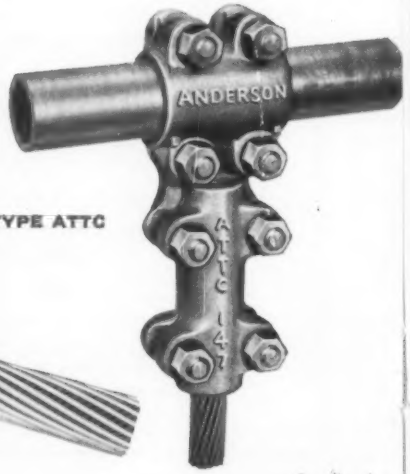


TYPE ATTC

the barrier that gives you 2 definite advantages

Economic comment

by J. Whitney Bunting, Ph.D.

Contributing Economics Editor

Education and the businessman

Only too often the local businessman and manufacturer, be he large or small, wants to know what he can do to aid education in the community. Often the answer readily appears to be a donation for the support of one project or another. In most cases these projects are worthy of support and often provide long range benefits to the society of which he is a part.

However, this may be the easiest course of action and yet may be entirely unrealistic from the point of view of both education and the business. It is for the purpose of opening a new vista of education-industry alliance that the following suggestion is made.

The most important resource available to business and industry in any region is manpower. The improvement of the economic climate in which a business operates is very definitely related to the supply of such manpower and the degree of *proper* education that that manpower supply has received. Certainly there are many areas of the world that have a far greater supply of unused manpower than the United States. The degree of success of the economic system, however, is directly related to the presence (or absence) of an educated and trained manpower pool.

The South, at the present time, has an unusual opportunity to develop adequate trained manpower through the proper interest of community leadership in educational affairs. The pattern of education in this area is advancing as rapidly as is the industrial development — in fact, in certain specific localities, it is advancing at even a faster pace.

However, even in these most advanced of communities, there is often a decided lack of information exchange between educational authorities and local businessmen. Since the businessmen become the largest customers of education's end product, should they not exercise themselves somewhat in planning the pattern by which these young people should be trained?

Moreover, should they not utilize their knowledge in such a way that young people can plan for more meaningful careers by the choice of proper subject matter while in the educational process?

These questions, and others like them, pinpoint a decided problem in business — education relations that only active interest can solve.

The area of guidance

One of the more valuable areas of educational interest for the businessman (and also one of the least expensive) is in the general province of guidance. Basically, businessmen are not psychologists nor have they had sufficient training in aptitude testing and the like to qualify as true guidance directors. However, their experience along the pathway of life has given some valuable perception of the pitfalls to avoid and the avenues to follow.

Moreover, from the vantage point of their own particular jobs and the businesses they operate or represent, they have a valuable understanding of practical education needed for success. This should not be held away from young people. Rather it should be offered freely as a beneficial service to the society of which the industry is a part.

Moreover, businessmen do have a social and community responsibility to aid in planning the direction of local educational policies. The type and quantity of educated manpower available to them will be largely dependent upon the facilities for education available in the immediate area.

The planning and sponsorship of post high school training such as local community colleges and technical institutes will go far toward preparing the manpower needed. Without business sponsorship, however, such ideas may wither before actually achieving fruition. Thus, it becomes good business to work for and develop good community educational resources.

People's capitalism

Another problem facing businessmen, particularly in their relations with colleges and universities, is the development of a new nomenclature for the business society.

This mass interest by thousands of American citizens, of all walks of life and of all income levels, in the ownership of shares of American industry has led to the development of a new descriptive term for the economic system — "People's Capitalism."

The phrase was developed to describe a capitalistic economy owned by many citizens, and not just a few. To the thousands of stockholders directly associated with corporations, there must be considered in addition, all those persons who have savings accounts, savings bonds, mutual funds, insurance policies, and other evidences of saving that may have been indirectly converted into shares of corporate ownership. Truly this economy has developed into a form of capitalism that is built upon the "free" ownership of business and industry by the people.

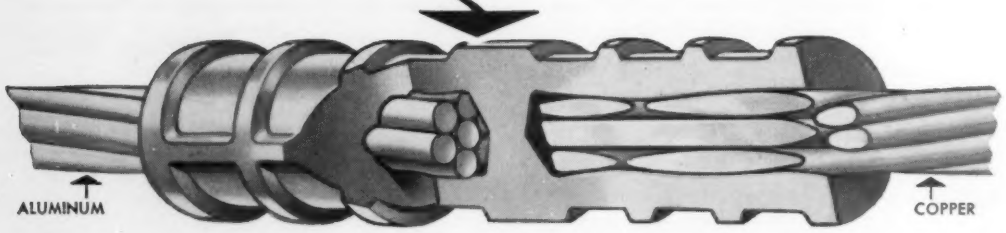
Much effort has been generated in publicity and news stories by businessmen to promote the greatest public understanding of the concept of "People's Capitalism." Through both planned and unplanned presentations, the story is being told today through every form of communication medium possible. General acceptance should come with general understanding.

In a recent national industrial

(Continued on page 116)

Dr. Bunting is a well-known economist and educator having special knowledge of the South.

the barrier that gives you 3 definite advantages



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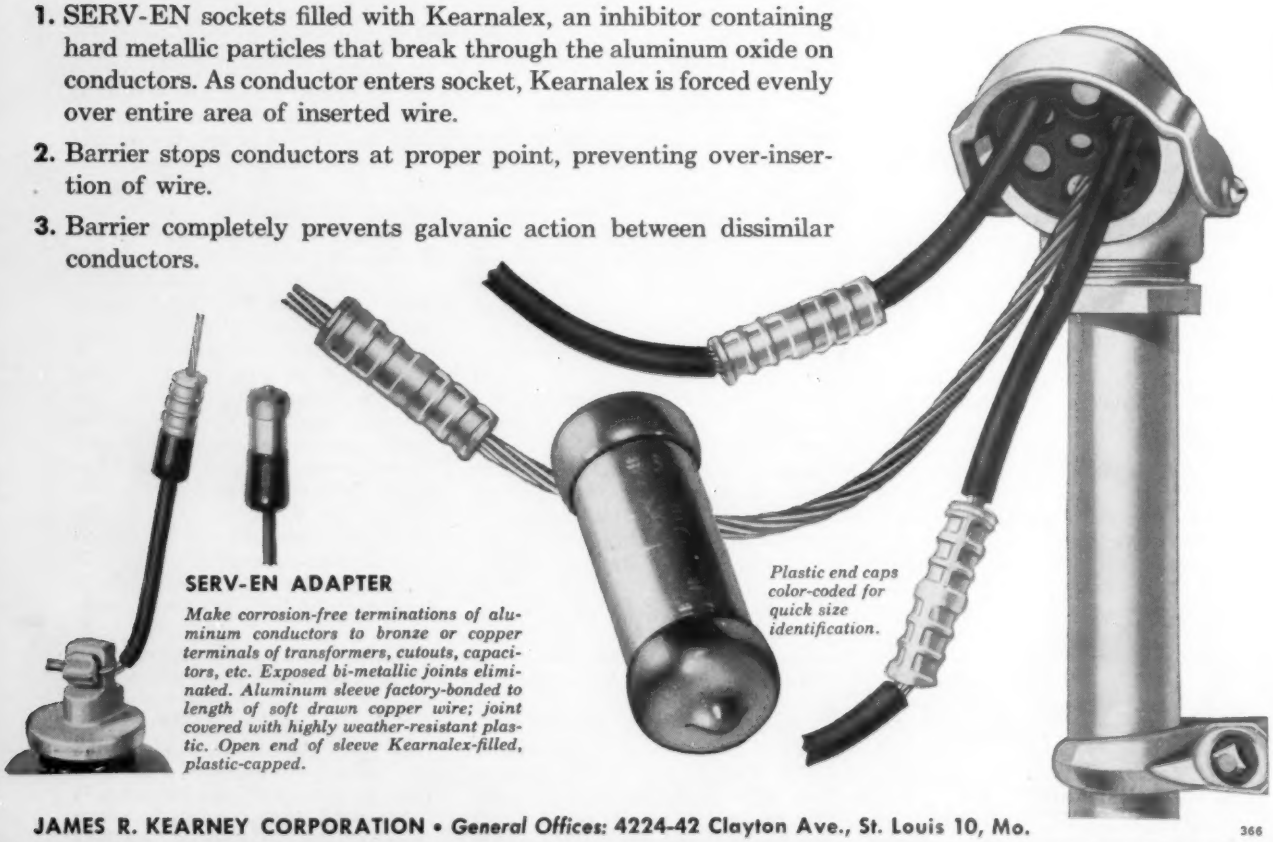

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Make corrosion-free terminations of aluminum conductors to bronze or copper terminals of transformers, cutouts, capacitors, etc. Exposed bi-metallic joints eliminated. Aluminum sleeve factory-bonded to length of soft drawn copper wire; joint covered with highly weather-resistant plastic. Open end of sleeve Kearnalex-filled, plastic-capped.

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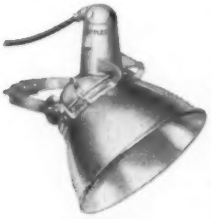

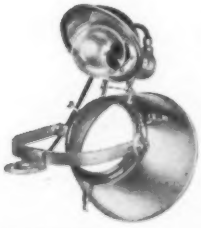

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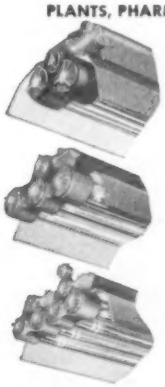

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Available Free to Readers of Electrical South upon Request

1011—Electrical Conduits

"Natural Electric Conduits" is the title of the 30-page Catalog No. 603 which describes and illustrates the many types of electrical conduits that are manufactured by National Electric Products Corp., 2 Gateway Center, Pittsburgh 22, Pa.

1015—Squeezon Connectors

The Squeezon, a new compression connector for power lines, is fully described in bulletin "SQ" available from the James R. Kearney Corp., 4236 Clayton Ave., St. Louis 10, Mo. The Squeezon features greatly increased electrical and mechanical efficiency.

1019—Service Panels

Information on protective electrical control centers for homes, apartment buildings, service stations, and industrial applications is contained in Bulletin PM-355, "BullDog Pushmatic Electric-Centers," issued by BullDog Electric Products Co., 7610 Jos Campau, Detroit, Mich.

1071—Plugs and Receptacles

Additional loose-leaf sheets for insertion in the Pylet Catalog 1100 are available from the Pyle-National Co., 1354 N. Kostner Ave., Chicago 51, Ill. These pages describe a wide range of plugs and receptacles for special purposes.

1085—Lighting Fixtures

Eastern presents their most complete catalog, 32 pages of engineered lighting data, including a variety of fixtures for all architectural, commercial and industrial applications. Eastern Fixture Co., Inc., 170 Vernon St., Boston 20, Mass.

1087—Fittings Catalog

The M. & W. Electric Mfg. Co., Inc., East Palestine, Ohio, has available their new 28-page catalog 53, covering Service Entrance Mast Fittings, Service Entrance Cable Fittings, Ground Clamps, Rods, BX and Romex Connectors, Conduit Fittings, Wireholders, Insulators Supports and Cable Racks.

1097—Cord Catalog

A complete 48-page catalog is available from the Cornish Wire Co., 50 Church St., New York 7, N. Y. containing all data on flexible and portable cords, lamp cords, heater cords, cordsets, radio and electronic wires.

1099—Lighting Fixtures

Fluorescent and incandescent luminaires for schools, offices, stores and factories are illustrated in a series of bulletins issued by Curtis Lighting, Inc., 6134 West 65th St., Chicago 38, Ill. The entire series or any individual bulletins may be obtained upon request.

1103—Compression Connectors

Burndy's new Bulletin CR-1A features the new Crimpit technique for all overhead distribution connections. The bulletin provides information on the entire Cripit line, including details of hydraulic installation tooling and accessories. Copy available from Burndy Engineering Co., Inc., Norwalk, Conn.

1107—RW and RHW Wire

"The Ampere Squeezer," a booklet explaining visually the effect of ambient temperatures on current carrying capacities of RW and RHW Wire. Simplex Wire & Cable Co., 79 Sidney St., Cambridge 39, Mass.

1109—Anchoring Devices

An illustrated 32-page catalog, No. 65, describing more than 25 anchoring and drilling devices for making fastenings to masonry, is available from the Arro Expansion Bolt Co., Marion, Ohio.

1135—Wiring Devices

Catalog No. 51, containing complete electrical wiring device line of Leviton Mfg. Co., Brooklyn 22, N. Y. is a 96-page thoroughly illustrated one. Included are such features as the Kwik-Change line, with wiring diagrams, a general index, and an index to catalog numbers.

1155—Wire and Cable

Two catalogs—Bulletin RS-5, and Power and Control Cables, No. 24—available from Rome Cable Corp., Rome, N. Y. Power and Control Cables catalog is intended for utility, construction, and industrial engineering and purchasing personnel as a guide in selection of proper wire and cable types.

1167—Industrial Lighting

A four-page catalog insert is now available from the Multi Electric Mfg. Co., Inc., 4223-43 West Lake St., Chicago 24, Ill. The leaflet describes Multi's line of lighting equipment and wiring devices, which include floodlights, vaporproof fixtures, and fluorescent and incandescent fixtures.

1195—Kitchen Ventilation

Descriptive eight - page folder, Bulletin 620H, showing typical installations of all models in the Clipper line of ventilators is available from Trade-Wind Motorfans, Inc., 7755 Paramount Blvd., Rivera, Calif. Folder includes dimensional drawings of installations helpful to building and electrical contractors.

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Nov., 1957

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1239	1241	1245	1251	1253
1255	1257	1259	1261	1263

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Self-dispensing Carton with Inventory Keeper to minimize waste

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Foot-after-foot Imprint shows at a glance the gauge, number of conductors and type of insulation

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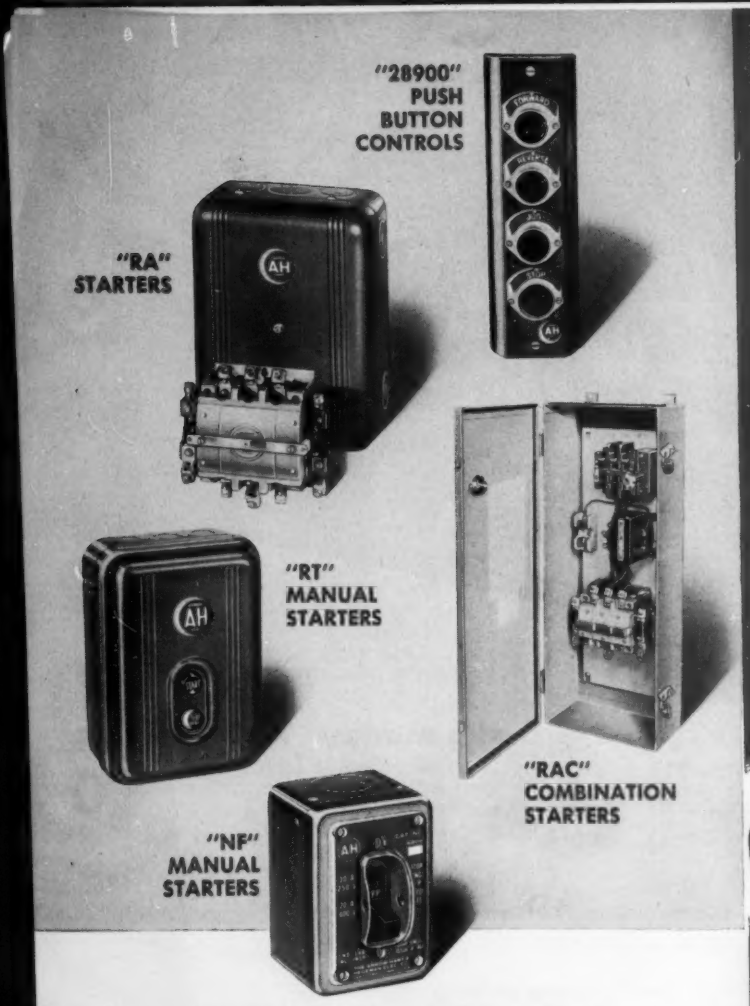

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LOOK FOR A GOOD NAME

The motor controls shown above, and all the other products in the *complete* ARROW-HART motor control line, bear a name that has earned a high rating in the electrical industry during the past 67 years. This fine name – ARROW-HART – is your assurance of motor controls you can rely on for quality and dependability.

Outstanding service – on-the-job assistance from field engineers for Arrow-Hart Distributors, Electrical Contractors and Plant Engineers – is another reason for ARROW-HART'S fine reputation. This combination of a *complete* line, a superior product *and* superior service makes ARROW-HART motor controls the *logical* choice. Write for a free copy of new Catalog No. 12 to The Arrow-Hart & Hegeman Electric Company, Dept. ES, 103 Hawthorn Street, Hartford 6, Connecticut or contact your nearest Arrow-Hart distributor.

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MOTOR CONTROLS • ENCLOSED SWITCHES
APPLIANCE SWITCHES • WIRING DEVICES

Enter Code Numbers of Catalogs Desired on Coupon on Page 8

1197—Convenience Outlets

Four-page bulletin gives complete information on the new P&S No. 500 for adding extra outlets to existing installations. Everything you need in a single package—on steel boxes required. Available from Pass & Seymour, Inc., Dept. ES, Syracuse 9, N. Y.

1209—Fluorescent Ballasts

Advance Transformer Co., 2950 N. Western Ave., Chicago 18, Ill., has recently completed the compilation and printing of a 20-page catalog on fluorescent ballasts and their use. Included are data sheets on available Advance ballasts and a comprehensive installation and operation section and testing procedures. Copies of the booklet are available on request.

1211—Fluorescent Fixtures

Catalog folder No. 911, "Peerlite by Guth," has been announced by the Edwin F. Guth Co., 2615 Washington Blvd., St. Louis 3, Mo. Copies of this new eight-page booklet are available from the company upon request. The booklet is designed for the lighting specialist, giving complete engineering data and dimensions.

1219—Electrical Enclosures

Catalog No. 5354-U is a 66-page catalog describing the complete line of steel and aluminum electrical enclosures manufactured for utility use by the B & C Metal Stamping Co., 590 Means St., N. W., Atlanta, Ga. The catalog is well illustrated and contains complete specifications as well as prices on all items in the B & C line.

1223—Circuit Protection

A 24-page illustrated handbook contains suggestions for selecting the right kind of protection for electric circuits, motors, appliances and apparatus. Includes motor wiring diagrams and a complete list showing proper size fuses to use. Available from Bussman Mfg. Co., University at Jefferson, St. Louis 7, Mo.

1227—Conduit Fittings

A new complete 4-page catalog illustrating their complete line of conduit fittings and lighting parts for the electrical wholesaler has been made available by Elliott Electric Products Co., 1513 Olmstead Ave., New York 62, N. Y.

1229—Switch and Outlet Boxes

A new RACO General Catalog is now available listing detailed information on boxes, covers, and bar hangers. The catalog includes data on numbers of wires permitted per box and a list of comparative catalog numbers. Copy available from All-Steel Equipment, Inc., Aurora, Ill.

Enter Code Numbers of Catalogs Desired on Coupon on Page 8

1231—Conduit

A handy, pocket-size booklet illustrating and describing four ways to greater conduit efficiency and lower installation costs has been published by Youngstown Sheet and Tube Co., Youngstown, Ohio.

1233—Troffer Catalog

A 36-page catalog, with complete information on their newly re-designed architectural troffers has been released by Smithcraft Lighting Division, Chelsea, Mass. Divided into sections for selection of lighting units, the catalog gives complete illustrations and data for 1 and 2 foot troffers in all types of ceiling construction. Also included in the catalog is information on ceiling lighting patterns, shielding designs, lighting techniques and applications.

1237—Wireholders

Knox Porcelain Corporation, Knoxville 1, Tenn. has recently redesigned a one-piece metal base style reinforced wireholder, No. 5009. Base and screw are hot dipped galvanized. This wireholder has extra sharp threads and quick starting point to make driving easy. KNOX manufactures a complete line of Porcelain Wireholders, House Brackets, and other Secondary Service Materials.

1239—Heavy and Light Duty Power Derricks

J. H. Holan Corp., 4100 W. 150th St., Cleveland 11, Ohio has available a 4-page catalog on the Series 4700 Power Derrick—a light-duty derrick that lifts loads to 6500 pounds, poles to 55 ft. They also have available a catalog on 3700 Power Derrick containing data on derricks for lifting poles up to 75 feet long and loads up to 12,000 pounds.

1241—Fans

A convenient file folder covering attic and industrial ventilating fans, up to 108" diameter, is available upon request from American Coolair Corporation, Box 2300, Jacksonville 3, Florida. The attractively illustrated catalog pages are bound into the folder, which is available with or without list price sheets.

1245—Exhaust Fans

Two new two-color illustrated four-page catalogs (Bulletin Nos. 6414 & 6514) describing the new Model G Ventura fans for business and commercial exhaust applications and Model K for industrial heavy-duty exhaust applications are now available from American Blower Corp., Detroit 32, Mich.

1251—Radiant Heating Cables

Three folders, describing Ceilheat's three types of radiant cables, are now available from Ceilheat, Inc., 5212 Homberg Dr., Knoxville, Tenn. One folder features the Aristocrat radiant cable for plastered ceilings, another describes Ajax radiant cable for concrete floors, and the third describes Dri-Cell radiant cable for dry-wall construction.

ARROW AH HART

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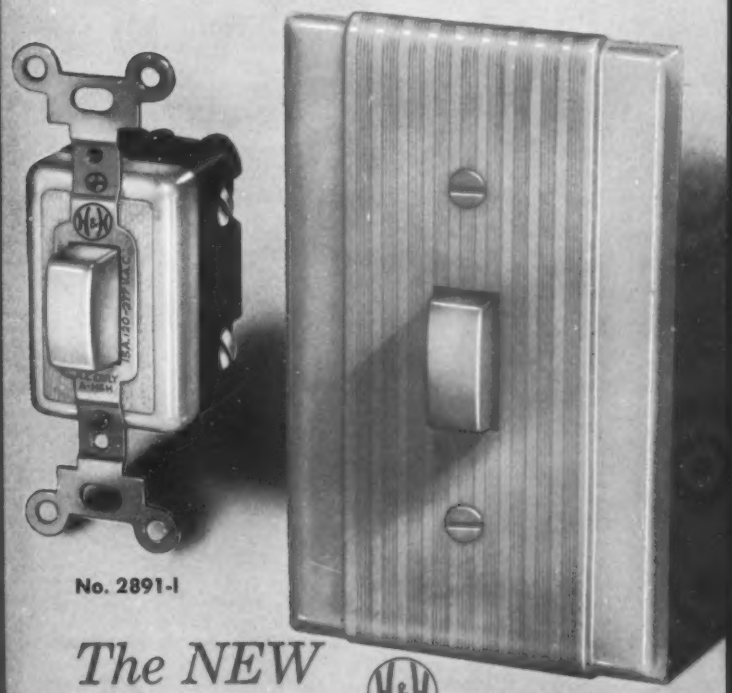

No. 2891-I

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For new installations or modernizing, it's easy to build customer satisfaction and bigger profits with this newest touch in lighting control. The Quiette Tap Action Switch – WHICH FITS ANY STANDARD TOGGLE WALL PLATE – turns quietly on *or* off at the tap of a finger-tip, hand or elbow. No toggle to flip, no knob to twist. Safely controls appliances and incandescent or fluorescent lights.

- **H&H SPECIFICATION GRADE, UL APPROVED**
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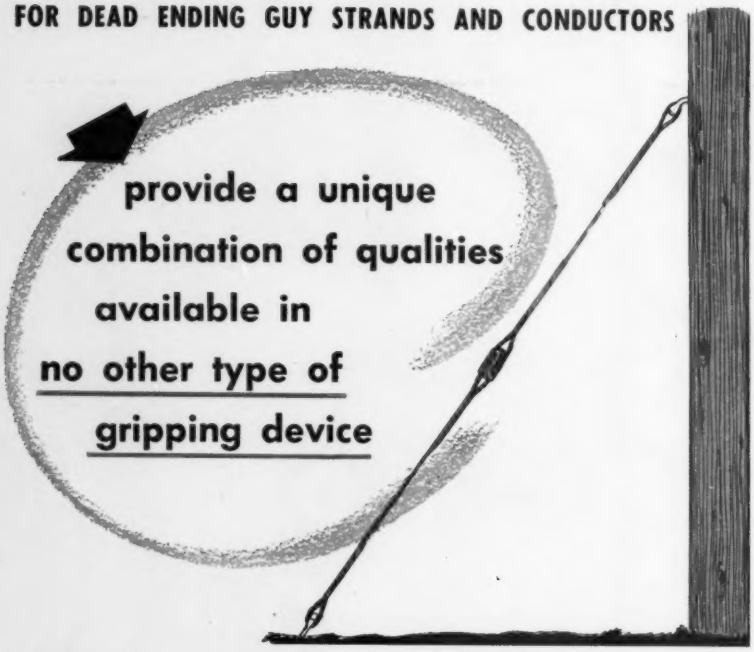

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- Permanently tight, self-clamping — no movement or relaxation due to load reversal.
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- Neat application without bulk — no dangerous or wasteful ends.
- Available in electro galvanized steel, copperweld or aluminum alloy.

No other dead-ending method matches FANNGRIPS economy!

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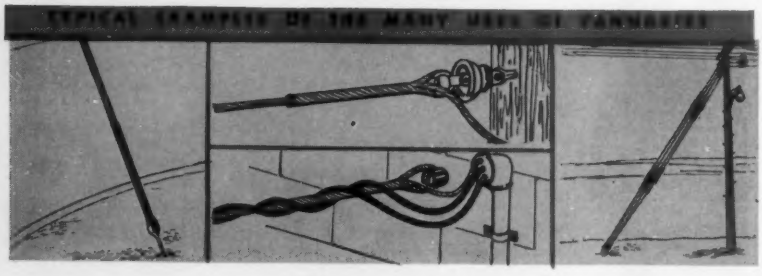

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PLASTIC INSULATING TUBINGS AND MOLDINGS

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1253—Power Connectors

A completely new catalog (No. 526) of power connectors and bus support clamps is now available from Southern States Equipment Corp., Hampton, Ga., superseding catalog No. 525-R. Furnished in a handsome 7-ring binder, the new catalog includes sections on bus support clamps, couplers and angle braces, bar connectors, Tee connectors, stud connectors, ground connectors, parallel clamps, and terminals.

1255—Electrical Tools

Tools for electrical construction, such as Hydraulic Benders, Hydraulic Pipe Pushers, Knockout Punches and Hydraulic Drivers, Cable Pullers, Screw Anchor Expanders, Pipe-Size Bits, etc., are shown in Catalog No. 35-E, published by Greenlee Tool Co., 2136 Twelfth Street, Rockford, Ill.

1257—Centrifugal Roof Ventilators

An 8-page, two-color folder (SDA-220) giving construction features, performance data, dimensions and recommended specifications for the new Centrifugal Roof Ventilator manufactured by The Peerless Electric Company, Warren, Ohio. Other important Peerless Fan and Blower products and a list of Peerless sales representatives are also included.

1259—Electrical Tapes

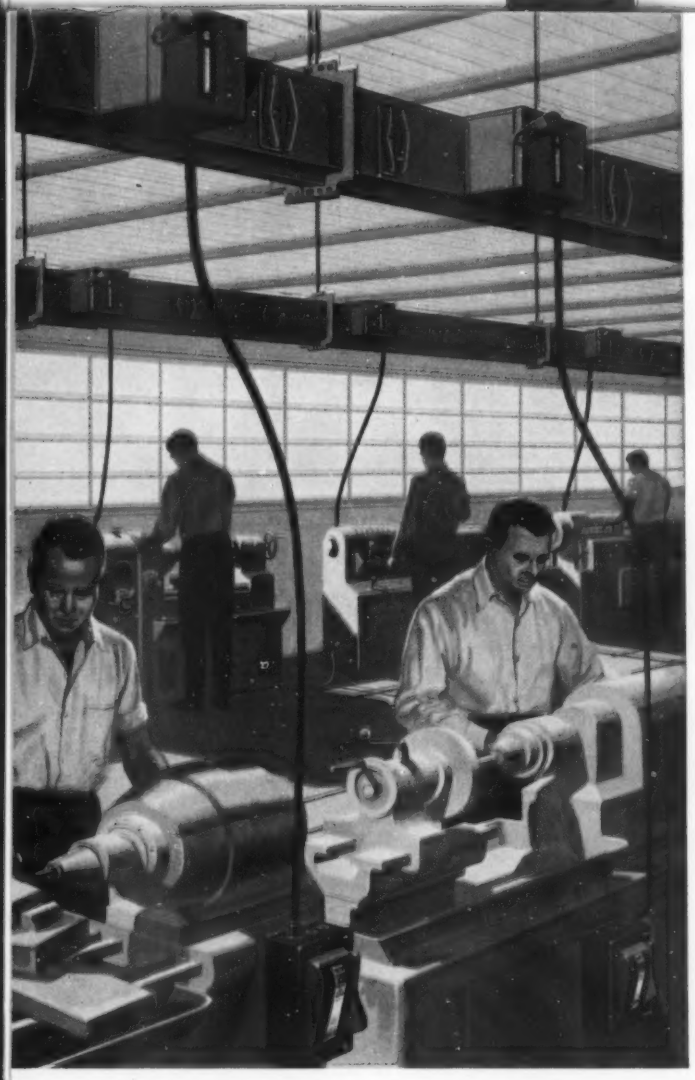
Twelve pages of specifications and application data make up an attractive booklet on Dutch Brand Electrical Tapes. Plastic, friction, and rubber tapes, as well as a vinyl tape made in nine different colors, are available from Dutch Brand Division, Johns-Manville, 7800 So. Woodlawn Ave., Chicago 19, Ill.

1261—Cable Puller

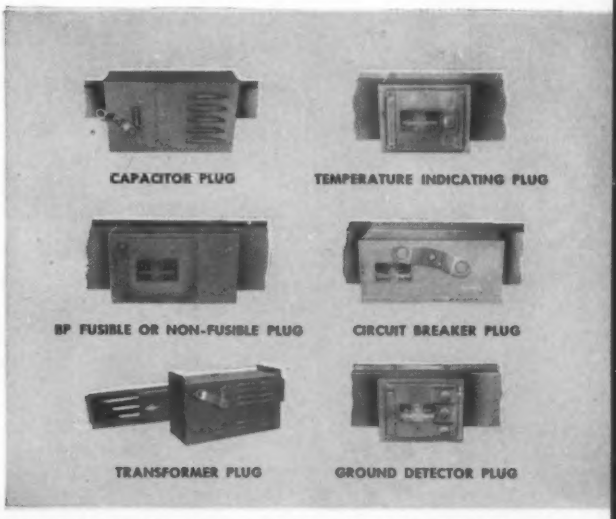
The electrically powered cable puller manufactured by The Barth Corp., 12650 Brookpart Rd., Cleveland 30, Ohio, is described in a new booklet. This tool is ideal for industrial and commercial construction and maintenance.

1263—Conduit Fittings

Bridgeport Fittings, Inc., 209 Center St., Bridgeport, Conn., offers a twenty-six page catalog describing their line of conduit, bushings, lock nuts, couplings, nipples, supports, connectors, and other fittings. Size, weight, and packaging details are included.



The Vacu-Break® Plug (above) taps live power, is available in 30 to 600 amps, 2 or 3 pole, 600 volts or less. Reinforced fingers on all plugs insure positive pressure contact.



All BullDog Bus Plugs mount on either side of the duct easily, quickly . . . eliminate rewiring and downtime. Types available for every purpose.

Seven rugged Bus Plugs provide flexible plug-in power

Get the most from power with BullDog Bus Plugs. Used with Plug-in Duct, the seven bus plugs range from safety-check plugs to types that tap power instantly from the duct . . . provide safe, flexible electrical distribution.

Plug-in openings are spaced every 10 inches along the duct. Handy to any machine, they reduce long costly branch-circuit runs. You simply plug in circuits where they are needed . . . connect equipment without cutting off power or interrupting production.

Learn how a co-ordinated BullDog distribution system, from bus plugs to unit substations, provides efficiency and flexibility for your clients . . . a wealth of customer satisfaction and profits for you. See your BullDog field engineer for complete details.

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IF IT'S NEW . . . IF IT'S DIFFERENT . . . IF IT'S BETTER . . . IT'S

BULLDOG

ELECTRIC PRODUCTS COMPANY

A DIVISION OF I-T-E CIRCUIT BREAKER COMPANY

BullDog Electric Products Company, Detroit 32, Michigan. • A Division of I-T-E Circuit Breaker Company • *Export Division:* 13 East 40th St., New York 16, New York. *In Canada:* BullDog Electric Products Company (Canada), Ltd., 80 Clayson Rd., Toronto 15, Ontario.

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WILSON ELECTRICAL EQUIPMENT CO.
101 E. Maple St.
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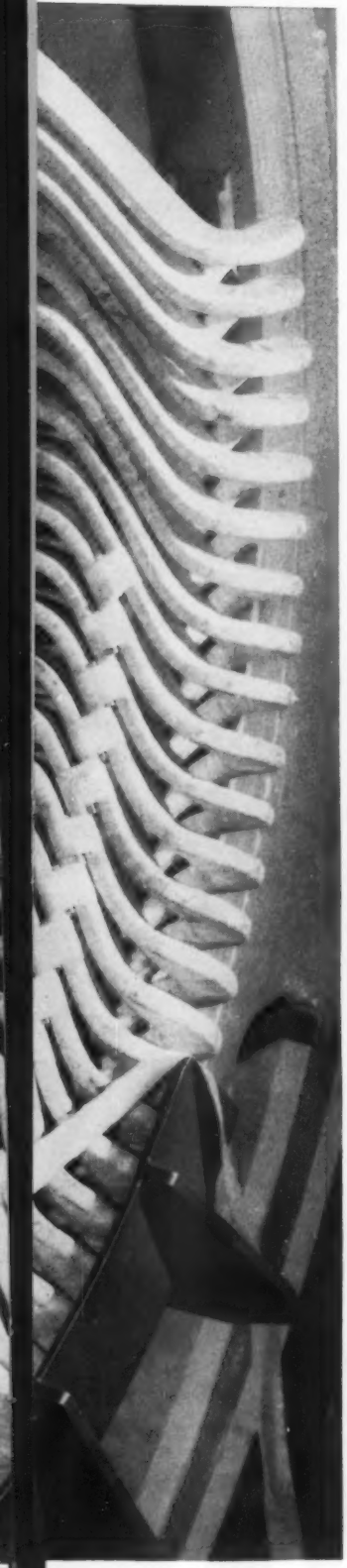
STANDARD ELECTRIC MFG. CO.
2401 Federal St., P.O. Box 1138
Dallas 1, Texas

WALKER ELECTRICAL CO., INC.
125 Bennett St., N.W., P.O. Box 8, Sta. D
Atlanta, Georgia

How many generators to

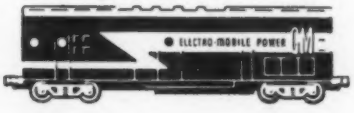
produce 24,000,000 kw ?



About 22,000—so far. That is the number of generators Electro-Motive has built during the past twenty years, for a total generating capacity of more than 24,000,000 kw.

As a leading manufacturer of electrical equipment, Electro-Motive has not only produced thousands of generating units, but in the process, has also contributed materially to "improving the breed." Electrical engineers at Electro-Motive are continuously experimenting with new design improvements, new processes that result in more efficient, longer-lived units.

It is this background of experience in production, design and research that stands behind Electro-Motive power equipment. It is your assurance of dependability, economy and long life under the difficult applications of low load factor generation for which they were designed. Why not ask your Electro-Motive representative for additional information?



1000 kw units for use on sidings or placed on piers for semi-permanent use.

500 kw units offer excellent mobility for many temporary applications.

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EASTERN'S NEW

ONLY ONE TENTH THE CREEP OF ORDINARY SHEATHS

Thousands of feet of Roebling Paper Power Cable with Tellurium Lead Alloy Sheath now in service bear out Roebling's exhaustive laboratory tests. This unusual sheath creeps only one tenth as much as ordinary copper-lead sheath! What's more, tests prove this sheath has 4½ times more bending life... outstanding stability under heat... retains excellent ductility year after year.

Sound good? It is—and so is the unexcelled paper power cable inside! In fact, if you're thinking about dependability *tomorrow*, as well as today, investigate this superior cable.

Get test data and an informative folder about Roebling Paper Power Cable with Tellurium Lead Alloy Sheath by writing Electrical Wire Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

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CAMBRIDGE SERIES

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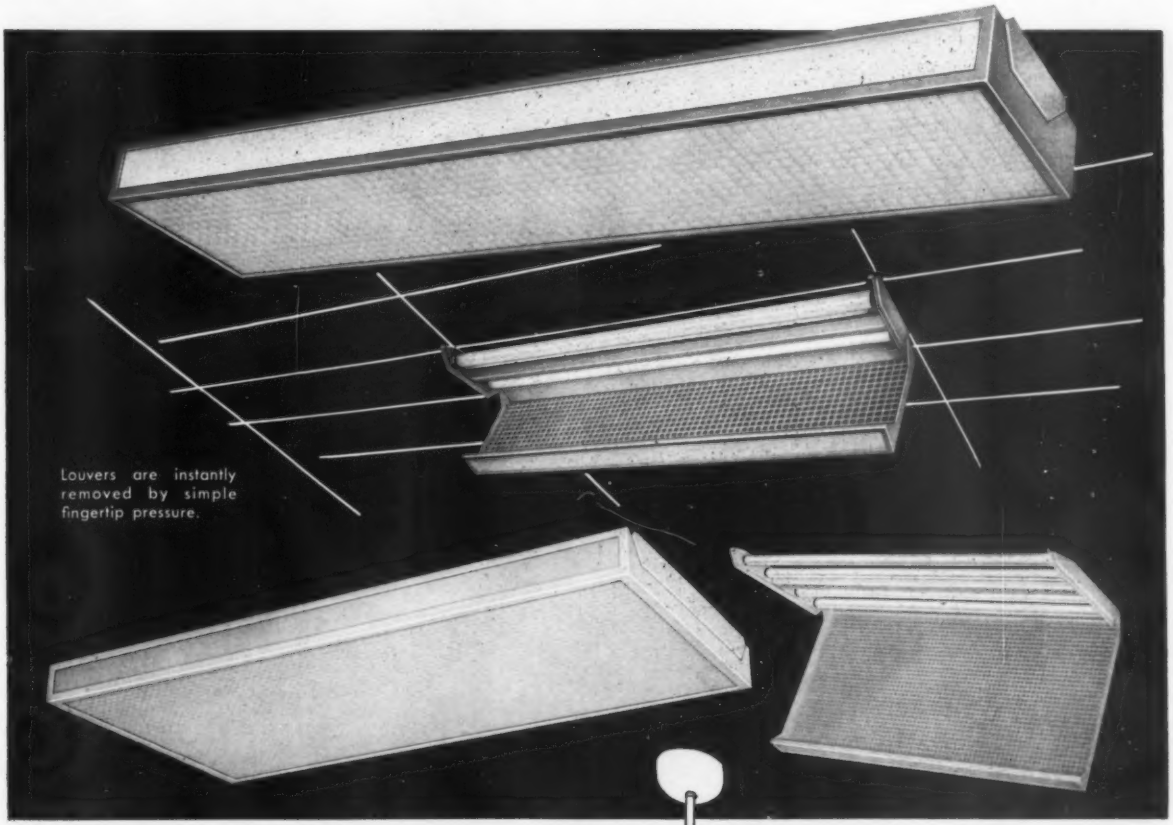

Another great achievement by Eastern — the brilliantly styled, clean-cut, new Cambridge series. Designed for every type of installation, these "thin man" 3¾" fixtures can be surface mounted to ceiling, suspended on hangers, or installed in continuous rows. Sides and louver lower as single unit to make maintenance easy. Slotted type reflectors — an Eastern exclusive — provide peak lighting efficiency upward and downward.

In 4′ and 8′ lengths, 12″ and 24″ widths, for 2 and 4 fluorescent rapid start or slimline lamps. Also for eight 40-watt rapid start lamps in tandem 42° x 42° shielding.

Available also for hanger mounting.

EASTERN FIXTURE CO.
170 VERNON STREET, BOSTON 20, MASS.

EASTERN FIXTURE CO.
170 Vernon Street, Boston 20, Mass.

Please send complete details on your new Cambridge series of fluorescent rapid start and slimline fixtures:

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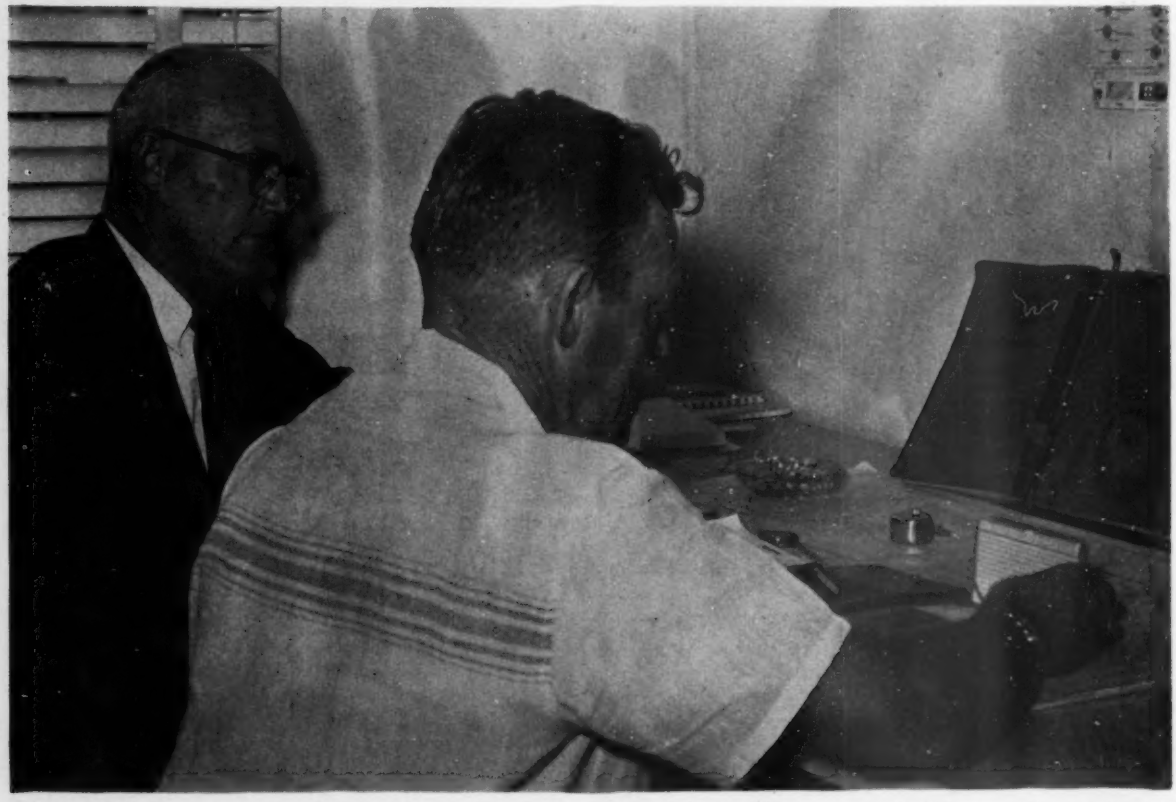
Contractor program trains

The St. Petersburg office of Doyle Electric Company; at left, one of the rugged line trucks used in making installations from outlets to sub stations. Stocks equal those of a fair-sized supply house.



Owner William H. Doyle (left) checks estimators' figures. Doyle claims that careful estimating has been the primary factor contributing to the continued growth and success of his firm.

expert estimators

With many contractors bidding for jobs in the mushrooming area of St. Petersburg and Tampa, Florida, William H. Doyle gives his estimators exhaustive training and constantly keeps them up-to-date on the financial condition of the company that they may accurately negotiate for overhead and profit.

By Harry J. Miller

This article should be especially helpful to the following readers:

- Electrical Contractors ✔
- Electric Utilities
- Electrical Wholesalers ✔
- Electrical Inspectors
- Industrial Engineers
- Consulting Engineers

◆ DOYLE Electric Company, of Tampa and St. Petersburg, Fla., does an annual business pushing the $2-million dollar mark. Its owner, William H. Doyle, a quarter-century veteran in contracting, and noted for the big jobs he lands both in Florida as well as out of the state, concedes that while estimating is a most vital factor in electrical contracting, it is a question of *training* as well as experience.

In estimating for the big jobs, competency comes first, he vows. "There is no room in such bidding for feeling one's way," is his belief. "The estimator must know his job and its requirements. I believe the electrical contractor can find and make such men right out of his own organization!"

And that's just what this contractor does, whose currently-running roster of jobs reads like a history of the mushrooming development in his area.

During the past year the Doyle firm, working forty men out of its St. Petersburg office and fifty men in the Tampa shop, did $300,000 worth of work ranging upwards from a $100 in the St. Pete area.

Jobs presently under way are contracts like the Meadowlawn School—$75,000; Highland School —$55,000; Post Office—$120,000; Madiera School—$19,000; Fairmont School — $15,000; Stetson Law Library—$40,000; and Long Key Sewage Disposal—$20,000; in the St. Petersburg area.

Over in Tampa, such jobs are running like the Exchange National Bank—$150,000; Davis Island Medical Center—$100,000; and the University of Florida dormitory at Gainesville—$160,000.

"In selecting estimating timber from among his journeymen, general foremen or superintendents," said Doyle, "the contractor needs to be precise in projecting the selectee's future.

"For example, the average journeyman shirks responsibility and is content to earn a week's pay. But the man whose initiative and ambition and capabilities have advanced him to a superintendent's post in our ranks, has shown himself willing to don the mantle of responsibility. Such a man is a logical candidate for the role of estimator.

"My superintendents have been with me ever since I've been in business. From their ranks I seek estimators and I work with and train them for their new positions."

Doyle offers such men their regular superintendent's salary, plus a commission on gross business. "By putting them on straight commission," he said, "they may think they're being unfairly compensated.

"But the only people in my organization who are familiar with our financial condition and financial health are our estimators and bookkeeper. Since the estimators know exactly what business we're doing, there is no room for distrust or corrosive relationships between us.

"Conversely, if the estimator is kept in the dark, how will he know for how much profit to negotiate jobs on?"

In training such men for the estimating field, the fact they've had a journeyman's background is a good send-off, Doyle finds. In addition, they are given access to literature on estimating, NECA courses in estimating practice. They need to be informed on how to take off materials, applying labor units, learning where and how to find them and how to adapt them within the framework of the business.

Doyle feels that if small or residential work is the scope of the contractor, it follows that simple training will make an estimator. But for a large operation, quasi-engineering techniques are required. The neophyte estimator must learn the fundamentals of his new craft; he must be oriented to product knowledge since there are constant changes in this expanding field. No one single avenue of training is the most practical or effective, according to Doyle.

"It is absolutely necessary for the contractor to exercise resourcefulness in searching out all of the training material and sources he can find." In this category could be included manufacturers' or distributors' schools, classes in local educational institutions, manufacturers' manuals, text books and short courses, and a continuing study of trade and technical publications.

"Some contractors use their estimators to run their business," said Doyle, pointing out that the embryo estimator needs to be shown how prices are charged; how to use supply catalogs and how to extend price figures, and to use published price lists modified by the firm's own experience in the light of local competitive conditions.

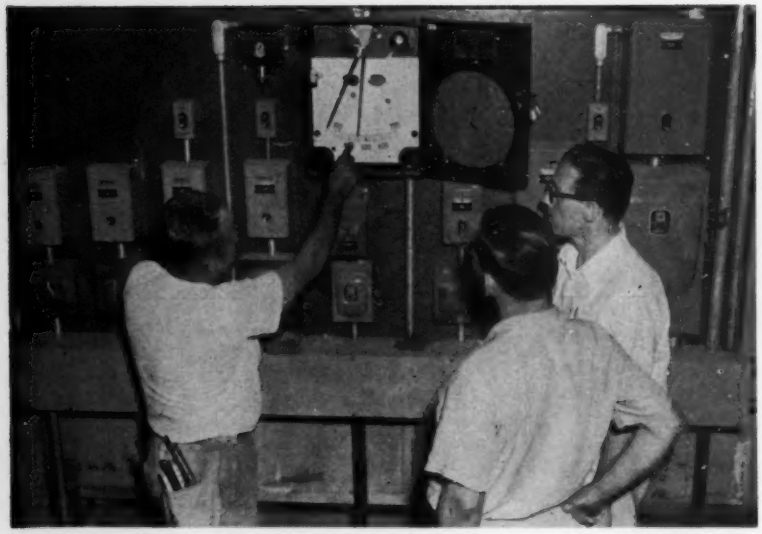
"And the estimator should be made aware that his labor units can go hogwild through inefficient help, and that a loyal superintendent on the job can cut any labor unit by getting the utmost out of his men.

"It takes two years for such a man to attain topnotch performance," said the Florida contractor.

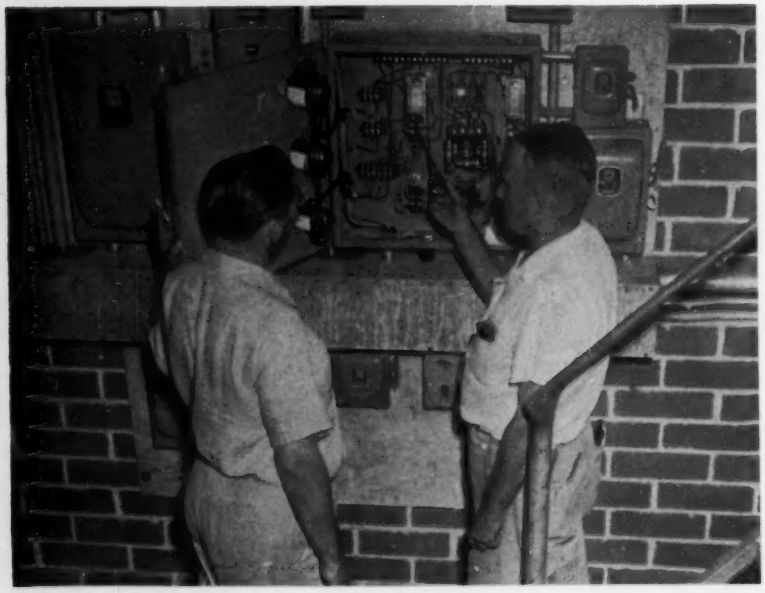
In the meantime, when the estimators compile their bids, Doyle sticks as close to them as his shadow. "The estimator's figures need constant checking, as do mine," he says. "This implies double checking actual figures against those on the sheets of materials, since it is amazingly easy to slip up on some vital item."

(Continued on page 120)

Automation: threat or



Discussing temperature regulator indicator and control panel are (left to right) Frank Blalock, J. C. Rodgers, and Barnard Smith. Experienced electricians find increasing complexity of electrical timing circuits challenging. The large potential in sight for modernizing small industries places a strong demand on electrical contractors to build staffs capable of "thinking things through" for themselves. Complexity of basic circuits can be expected to increase.



Frank Blalock (right), construction electrician for Cleveland Electric, explains timer circuits to cooperage firm's superintendent, J. C. Rodgers. Most modernization for small industry involves increased use of standard magnetic timing circuits. However, they are installed in a manner a little more complicated than before.

By E. R. Bonds

Electrical Engineer
Cleveland Electric Company
Atlanta, Ga.

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electric Utilities
- Electrical Wholesalers ✓
- Electrical Inspectors
- Industrial Engineers ✓
- Consulting Engineers

◆ IN MY OPINION, automation — the electronic control of modern machinery — does not pose a serious threat to the electrical contractor. Automated equipment is expensive, fitted for widespread use by only a small number of businesses, and, at best, represents only a small fraction of the electrical contractor's business potential today.

There has been a lot of publicity directed to automation recently. These stories have highlighted the expanding interest in electronic controls by businessmen and industrial leaders, and, in some instances, electrical contractors have expressed concern about the effect automation will have on their businesses. They foresee an all-electronic age requiring staffs of "electronic exeprts," all especially trained to install, maintain, and service electronic equipment.

At Cleveland Electric Company, we do not believe this apprehension is justified. These contractors, noting the "doom" of their businesses, are not realistically analyzing automation. It's not likely to eliminate our regular business. On the contrary, it will present us with yet another field for maintenance and installation. Our regular electricians can take a course of instruction provided by the manufacturers of electronic controls, and thus, we can take advantage of the newness of this business to add to our volumes.

People who make machinery and controls for automation handle the whole operation themselves. The

opportunity?

only function we can provide today is that of a staff to help with installation. Experts from the companies providing the electronic controls provide the know-how for trouble-shooting, and as your electricians gain experience, the principal maintenance jobs will pass on to them.

Mechanization increases

Let's be practical. Contractors like us cannot go into machine shops and make controls for automated equipment; however, we can provide all the services for mechanized equipment if we stick to our trade and apply our wide knowledge of standard industrial controls and components. It is in the area of mechanization, not automation, that the electrical contractor's greatest future lies.

What do I mean by automation and mechanization? As I see it, automated equipment is that which is controlled electronically. Except for starting and stopping the machinery, men do not have to perform any of the functions required for the proper operation of the unit.

On the other hand, mechanization implies the use of machines to perform jobs set, adjusted and controlled by men. Most of the work ahead for electrical contractors will be in satisfying the trend toward modernization by the small industrial firm. These firms must install better machinery, mechanized to do better, more efficient jobs with less contact and control by plant personnel, in order to compete.

Many of these new units will simply require loading and unloading by personnel and timers, cut-off switches, temperature controls, and other standard electrical components will be used in great abundance. In short, future installations will simply require the contractor to apply basic knowledge in more complicated situations.

This trend toward plant modernization by small industrial firms has been developing for some time now. World War II has been over for 11 years, and many of the successful businesses established then are now cramped for space, their equipment is outmoded or obsolete, and, in general, they are ready to modernize.

Three success factors

This is the direction in which the electrical contractor should look for business. If a contractor is good at his standard trade, he will be able to grow with this trend. However, there are three factors which will determine his success.

First, he must not only be competent, but he must get over to everyone of his customers that he wants to help the customer with all of his electrical problems, regardless of size. This means, he must give the same attention to a customer's small service call as he would if the customer said, 'We're going to modernize. Come on over and help us plan it.'

Second, the contractor must have competent engineering consultants available to advise the customer on the best electrical layout when little or no advice is available for the best arrangement of the customer's machinery. There are few experts in the country who can advise on the proper layout, and, in many cases, wiring diagrams sent along with new equipment are vague or completely unreliable when applied to the customer's requirements. In cases where old equipment is simply moved to the new building, diagrams for its installation have probably been lost or thrown away years ago.

Third, the contractor must build a staff of competent, experienced electricians, both for maintenance work and new-construction details. They are your true representatives with your customers, for, in most instances, they see more of the customer than you as they make their frequent calls for maintenance or installation.

Example of modern trend

By way of illustrating all that's gone before, I'd like to cite a recent plant modernization job we handled for one of our oldest customers — J. & B. Smith Company, Inc., reconditioners and dealers in

(Continued on page 122)

Frank Blalock adjusts only electronic tube circuit in entire installation at J & B Smith Co., Inc. It times pilot light and high-fire circuits on bake oven.

Harris Gray rolls drum into machine which cleans lids and drums. Timers on control panel were rebuilt by Cleveland Electric after damage in transit. Operation is completely mechanical except for loading and unloading, yet machines of this sort are often included in the "automated" group by contractors unfamiliar with the term's meaning.

Fixture sales campaign doubles

C. P. Cheeks strives to offer customers the widest possible selection in lighting fixtures to meet demands for both the modern and the traditional. Showroom overlooks a large parking lot for customers and faces site of super highway which will soon be underway.

Creating an atmosphere of friendliness is part of the campaign at Cheeks Electrical Service, in West Monroe, La. A small refreshment center provides free coffee and soft drinks for all customers.

By S. W. Ellis

This article should be especially helpful to the following readers:

- Electrical Contractors ✔
- Electric Utilities
- Electrical Wholesalers ✔
- Electrical Inspectors
- Industrial Engineers
- Consulting Engineers

◆ A HANDSOME NEW show room facing a super highway that soon will go under construction, extra comforts for customers, and well-planned advertising have doubled lighting fixture volume for C. P. Cheeks, owner of Cheeks Electrical Service, West Monroe, La. Fast-growing volume has made immediate expansion necessary. A 40-foot wing is now being added at the rear of the new building for an air-conditioning department that will function like the lighting fixture showroom, with beauty, comfort, and plenty of light for demonstrations and sales.

Cheeks grows enthusiastic when he relates the good results his new showroom has brought. "I've always known that people like to buy electrical fixtures from the contractor who does their wiring. But like every other customer who buys things for the home, the prospect for lighting fixtures wants a wide selection, comfortable surroundings to make leisurely selections, and adequate sales help.

"The trend is toward lighting with something new and different in appearance. I offer my customers the widest possible selection, making sure that they will see on display here what they read about and see in the new homes of their friends.

"In selling lighting fixtures, few claims can be made for extra performance. Just plain good, enthusiastic selling is needed, to show the customer the utility of the fixture from the standpoint of good lighting, and to assure her that the unit will not go out of fashion very soon."

Cheeks attracts prospects to his new showroom with signs about

volume for electrical contractor

town, some of which carry the small street map which also appears in a large display advertisement in the telephone directory. Cheeks features the street map because he constructed his new building on the edge of town, away from traffic for the present. That traffic will be routed by his door when the new highway is finished.

Arriving at the new buff brick structure, with its modernistic glass front, the prospect has plenty of parking space. Inside the door, he sees a handsome interior done in pastel tints of green, apple blossom, and grey. The ceiling is filled with a wide assortment of fixtures in a broad price range, with smaller wall fixtures down the walls, all of which can be lighted for demonstration.

Movable fixtures are in demand now — those that slide on the ceiling, move up and down, or swivel around. Many of these are shown, and prove attractive and fast-selling items.

Peg boards, ranged along the walls, show an assortment of fast-selling electrical lighting items, including lights for medicine cabinets, door chimes in variety, and burglar-alarm systems for the home.

Hospitality valued

Foremost in the plan to make customers feel comfortable and at home is a refreshment nook which includes coffee dispenser and soft drink stand. This creates the atmosphere of friendliness that Cheeks considers valuable.

Essentially an electrical contractor who makes both industrial and home-wiring profitable, Cheeks insists that traffic-building activities add considerably to sales volume.

"There's lots of competition in this business. Prospects for both wiring and lighting fixtures will shop around unless the contractor has some plan to attract them and discourage shopping. Providing them with a comfortable display room, well stocked with modern fixtures, and within easy driving distance, is our way of meeting competition."

Cheeks considers the future, and tries to analyze what can be expected in his line. Air-conditioning, in larger volume than ever for homes, has his special attention now. Having won himself a reputation for the good service he gives in wiring for air conditioning, he is now getting set to do real volume in selling air-conditioning units.

When his new air-conditioning display section is completed, he plans to launch a sales - and - advertising campaign designed to educate people to the fact that air-conditioning consists of a good unit plus correct installation. He insists that 75 percent of air-conditioning troubles he is called upon to correct are caused by defective wiring. The pressure switch is not connected properly, or voltage is down. He sells air-conditioning as a unit — the system plus the wiring.

His favorite advertising medium for both light fixtures and air-conditioning is direct mail — letters and manufacturers folders. He likes to send mailing pieces describing something unique in lighting fixtures. Many people, even recent home buyers, are willing and eager to change lighting fixtures when something new is presented. These direct-mail pieces go out in statements mailed to home owners and to contractors.

He also values a large display advertisement in the telephone directory, and always has one measuring 5 inches over two columns. Using street and road signs now, he plans more of these in future.

Sales efforts are backed by fast service, made possible by an unusually complete service-and-delivery fleet. That fleet consists of four equipped electrical service trucks, one equipped panel truck, a jeep, and a motor scooter. The motor scooter is used for special delivery and to take permits and messages to men at work on jobs about town.

Cheeks is assisted by five electricians and a delivery-messenger. His wife and the bookkeeper act as hostesses and saleswomen. No one enters the door without being greeted as though he or she were entering a real home.

Modern electrical wiring and service presents a challenge to a good salesman, Cheeks insists. "We don't leave sales to chance. We set up a real sales program here, and work to carry it out."

New low-voltage power circuit breakers and

A completely redesigned low-voltage power equipment line features quick-make manual closure; closed-door draw-out operation; sub-assembly breaker construction, permitting easier, faster parts replacement; four-high stacking of 600-ampere frame size; semi-flush pull-down handle; stored electrical closure that sharply cuts secondary circuit requirements; and greatly increased accessibility for operation and servicing.

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electric Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors ✓
- Industrial Engineers ✓
- Consulting Engineers ✓

◆ COMPLETE RE-DESIGN of its low-voltage power circuit breakers and of the switchgear that makes use of them has been announced by the Switchgear Division of I-T-E Crcuit Breaker Co., Philadelphia, Pa.

The result is their most sweeping advance in thirteen years in this type of electrical equipment — in terms of improved performance, greatly simplified operation and servicing, and standardization in construction and assembly.

The K-line circuit breakers — 600-volt units in 225-, 600-, and 1600-ampere frame sizes — feature unprecedented quick-make manual closure of breaker contacts. I-T-E designations for its new breakers are K-225, K-600 and K-1600.

The breakers, as much as one-third smaller and 55 per cent lighter than comparable units, also have a new motor-driven stored-energy system for electric breaker closure, easily interchangeable overload trips and vastly increased accessibility to trips and other breaker parts.

Sub - assembly construction slashes time needed for parts replacement and servicing.

The switchgear — which meets a new low in frontal area design — introduces closed-door draw-out for low voltage power circuit breakers. Breakers can be moved from operating to test and disconnect positions within their enclosure without opening switchgear cabinet doors.

Reduction in breaker size permits four-high stacking of 600-ampere breakers in standard 90-inch high enclosures.

The new K-line breakers and switchgear are designed for commercial building, industrial plant and power station applications — for the switching, control and protection of motors, generators, transformers, feeder circuits and other large electrically-powered equipment.

Major advances in the K-line circuit breakers, which in addition to use in I-T-E's own switchgear, will be sold to independent switchboard assemblers, include:

Quick-make manual closure — a feature that can greatly prolong the life of contacts and even of the breaker, itself, by eliminating damaging arcing that results from

Breaker is withdrawn from compartment on telescoping, two-stage wheels. Pull down handle actuates manually charged stored-energy closing system. Accessible trips, on both manual and electrical types, provide a new ease of adjustment. All three trips for this 600-ampere breaker are mounted on a single molding.

switchgear

slow, careless closure by hand.

Motor - driven stored - energy system for electrically-actuated models — This stores energy for closure, thus cutting drain on breaker's secondary circuit from as much as 160 amperes down to 10 amperes.

Greatly reduced size and weight — a design and installation advantage for switchboard assemblers and a convenience in servicing for equipment users.

Sub-assembly construction—Six sub-assemblies take the place of the 130 separate major parts in previous models. A part replacement formerly requiring an all-day overhaul of the breaker may now be only a one-hour matter of removing and replacing a unit sub-assembly.

Interchangeable overcurrent trips — now readily replaceable, through use of sub-assembly construction, to facilitate planned increases in load capacity.

Complete accessibility of trip units — the result of a more open breaker design. Even in electrically-acutated models where motor and additional accessory controls are built into the breaker, the user still has complete access for setting or removing trips.

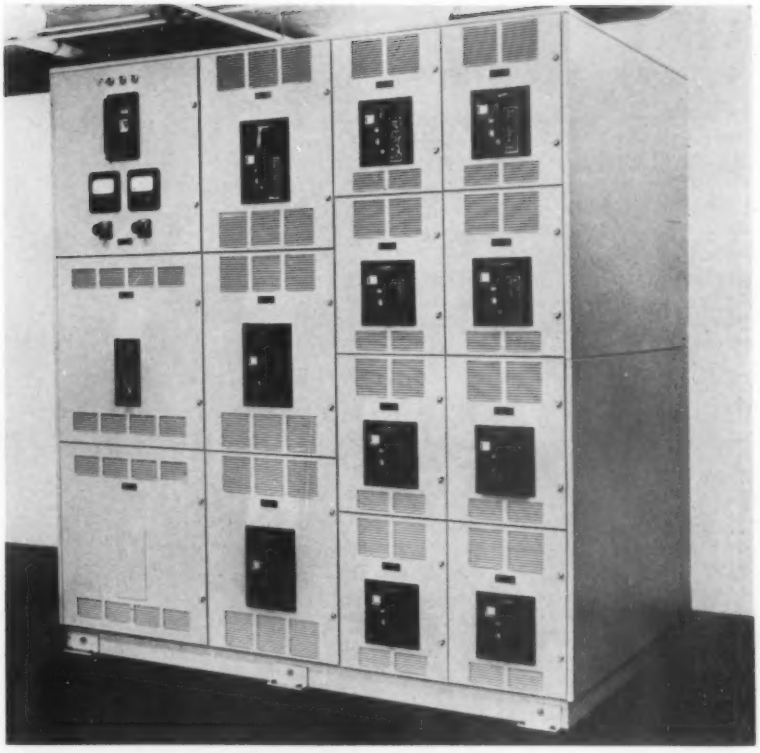
Simplification of trip continuous current ratings — nine trip units now cover complete range of continuous current ratings — from 15 to 1600 amperes — that formerly required 23 different trip units.

Automatic trip indicator — An escutcheon - mounted, automatic trip indicator shows that the breaker has tripped on overcurrent or undervoltage.

Pull-down handle actuates the stored-energy closing system — The handle's streamlined, semi-flush design prevents accidental breaker tripping.

I-T-E's switchgear—in addition to advances of the incorporated K-line circuit breakers—also have the following design and construction innovations:

Closed-door draw-out—Switchgear doors can be kept shut under all conditions of breaker test and operation and during movement to all positions. In addition to added



This switchgear grouping shows four-high stacking of 600-ampere circuit breakers. Breaker line (rated at 225, 600, and 1600 amperes) includes manual quick-made, closed door drawout to test and disconnect positions, and parts standardization including sub-assembly construction.

Breaker can be moved to test and disconnect positions without opening compartment door. Closed-door drawout is accomplished by turning small crank which is inserted through lift shutter opening in breaker escutcheon. Shutter can not be lifted until the breaker is tripped.

safety, this protects breaker from atmospheric dirt, dust and other foreign matter in many applications.

Smaller size — than comparable low voltage power switchgear units are narrower.

Unitized construction that reduces switchgear to three basic components — the breaker, the switchgear enclosure and a cradle assembly on which breaker slides for drawout. Standardization of this assembly and the switchgear enclosure simplifies interchange of various size breakers.

Quick-make feature

Quick-make closure, formerly available only on electrically-operated breakers, now is a standard feature of all manual breakers in the new K-line.

A spring-action mechanism provides the manual quick-make action. It is powerful enough to close the contacts safely against a full short-circuit fault current.

The first 90 per cent of travel of the new pull-down handle stores energy in the spring. Only in the last 10 per cent of travel is the stored energy released to close the contacts.

Thus breaker life and operator safety do not depend on the operator's arm and brain. Formerly, a breaker could be destroyed by careless manual closing against a major fault. The new line eliminates this possibility. Because contacts can not be teased together slowly, breaker life is greatly increased even when only closing against rated loads.

Electrically-operated models in the K-line have, in addition to the basic manually-charged mechanism, an actuating motor.

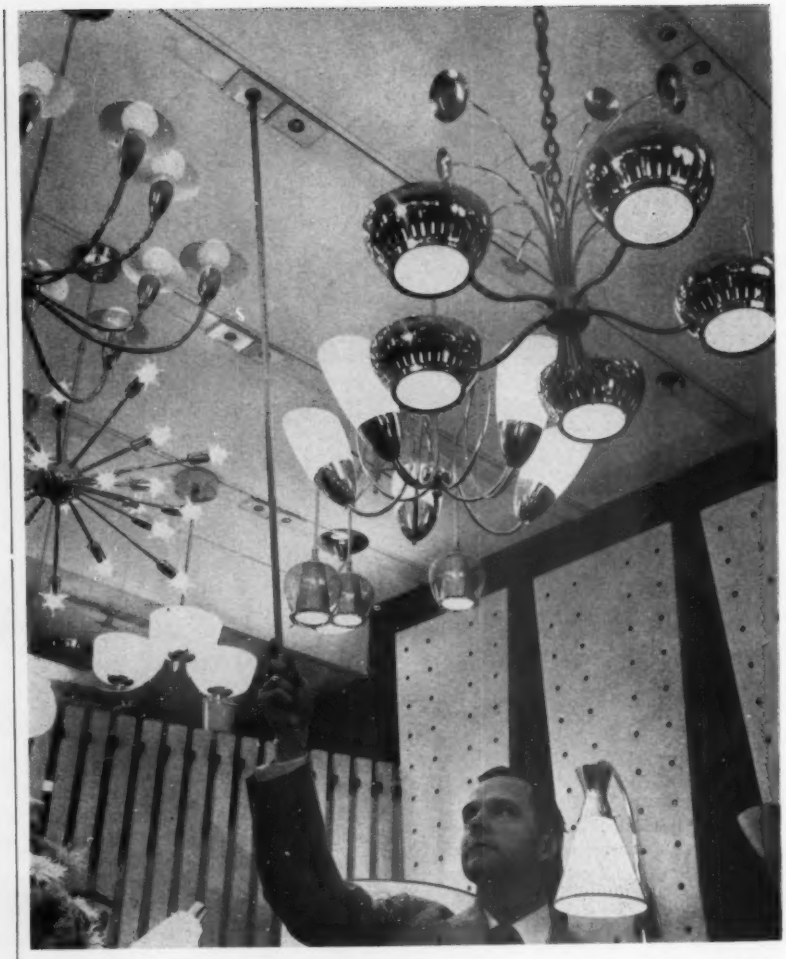
This motor-driven stored-energy system requires only 10 amperes from a simple power source, such as an ordinary lighting circuit, compared to as much as 160 amperes needed by other breakers. Energy for closing is pre-stored, by the K-line breakers, within two seconds. Closing time is five cycles. Other types have to draw high current from a secondary circuit, the instant it is required.

Size reductions

Four-high stacking of the K-line 600-ampere breakers is made possible by one-third reduction in height of this breaker.

Height of the 1600-ampere size breaker has been reduced by one-

(Continued on page 121)



Installation of Minneapolis-Honeywell Tap-Lite switches in this lighting fixture display eliminated a mass of cords hanging from ceiling.

Novel lighting display switch

◆ HERE'S a new switch on lighting!

The new showroom of a progressive lighting fixture studio has eliminated the need for customers to grope through a "jungle" of pull cords to view fixtures; it has mounted the switches on the ceiling!

Architects did away with the cords by installing 150 special wall switches in the ceiling. To turn on any light the salesman simply taps one of the ceiling-mounted switches with a rubber-tipped pointer. The pointer helps focus attention on special features of the fixture.

Normally the single-button switches are installed in the conventional manner and location on the wall. They can be operated by a gentle tap of the fingertips—or the elbow if the hands are full.

The switches are mounted in raceways above the fiber glass tile suspended ceiling. Each is supplied with a snap-on "decorator" cover of transparent plexiglass which protects the ceiling if the salesman's aim is unsteady. White cardboard inserts are mounted behind the cover so the switches harmonize with the color of the ceiling just as in a home where inserts of matching wall colors or wallpaper are used.

Prices, stock information and other coded data normally appearing on pull-cord price tags is kept on nearby wall cards.

These before and after photos show the dramatic effect of a Tampa jewelry firm's new lighting system, which has reportedly increased sales 30 per cent! Illumination was increased from a spotty 15 ft-c average to 50 ft-c by using 500-watt recessed louvered units with three incandescent crystal chandeliers installed down the middle of the store to produce a quality atmosphere. To give the proper quality and quantity of illumination needed in displaying jewelry, incandescents were used throughout.

Lighting makes the difference

By J. A. Savarese, Jr.
Lighting Specialist
Tampa Electric Company
Tampa, Fla.

This article should be especially helpful to the following readers:
Electrical Contractors ✓
Electric Utilities ✓
Electrical Wholesalers ✓
Electrical Inspectors
Industrial Engineers
Consulting Engineers ✓

◆ ONE OF THE leading jewelry firms in Tampa, Fla., Adams-Magnon Jewelry Co., recently modernized their store with light. The jewelry store has been doing business in the same location for twenty years, and through the years has built up considerable prestige.

Even though the store had a large regular following, there was a definite need for creating a brighter, more modern look to the store. Every four or five years a few fixtures were added here and there to increase the illumination until it equaled a spotty 15 foot-candle average. This was accomplished by using 200-watt recessed nonlouvered units, four lamp 40-watt bare units, and 200-watt incandescent chandeliers.

The management decided to modernize the store, and the first thing to be done was to change the lighting. The lighting specialists of Tampa Electric Company were called, and after a careful study of the problem, they presented plans for a new lighting system.

Modernization with light

The plan called for a layout to produce 50 foot-candles of illumination and still give the quality of illumination needed to sell jewelry, crystal, and silver. It was immediately decided to use incandescent lighting throughout.

The store's dimensions are 68 feet long, 24 feet wide with a ceiling height of 13 feet, 4 inches. 500-watt recessed louvered units were installed to produce an average 50 foot-candles of general illumination. Three incandescent crystal chandeliers were installed down the middle of the store to produce a quality atmosphere. This gave the proper quality and quantity of illumination the management needed in selling and displaying the merchandise.

Sales up 30 per cent

Mr. Magnon says "customers are responding to the atmosphere created by the improved lighting. The resulting sparkle and beauty given every item on display has been simply amazing. We were able to get the effect we wanted purely through lighting. There were no expensive alterations, no carpenter work or other major revisions necessary."

As proof positive of the effectiveness of the lighting, Mr. Magnon reports that sales are up 30 per cent since the new installation has been completed!

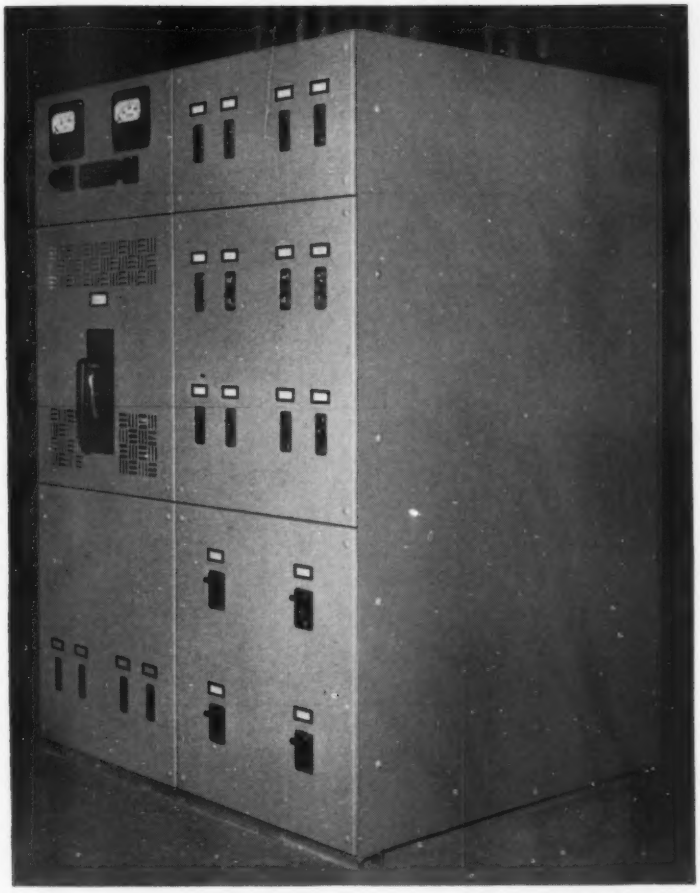
BE MODERN,

stop "knife throwing" . . .
buy Westinghouse

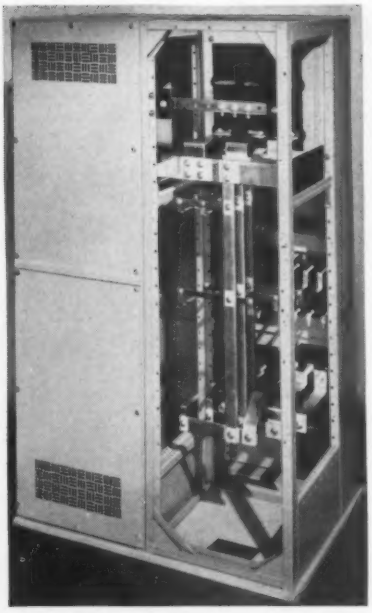
the new way to insure the most convenient, most flexible and safest centralized control of circuit distribution is with Westinghouse switchboards. Factory wired and assembled to your specifications, a building-type distribution switchboard like the one at right is a cinch for the contractor to install and a pleasure to operate and maintain.

the old way was a "knife-throwing" act in which electrical men worked with open-blade switches and a Chinese puzzle of wires, cables and fuse blocks.

The illusion that clinging to the old systems is economy just because "there's a lot of good years in it yet" is quickly dispelled when you examine the facts. Let a Westinghouse engineer show you what it means to reduce power losses, cut accident and insurance rates, save space and manhours with modern distribution equipment.



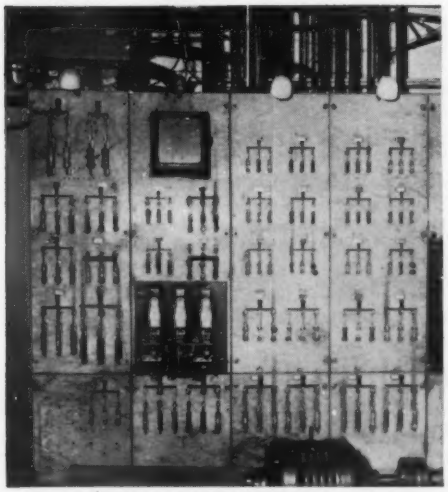
THE NEW WAY



Cross section of switchboard cell showing sectionalized construction, bus bars and supports, convenient access.

At left, a Westinghouse building-type distribution switchboard. Totally enclosed construction, dead front, safe and simple. Protective devices built in.

THE OLD WAY



current literature tells the story of Westinghouse switchboards and how to plan distribution the new way. There are bulletins on panelboard selection, too. Write for your choice today. Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

J-93538

YOU CAN BE **SURE**... IF IT'S

Westinghouse

Contractors tell how

Careful supervision on jobs is his key to profits

By Don L. Frazier
Owner
Murray Electric, Inc.
Kansas City, Kans.

◆ SUPERVISION IS the duty of management and this responsibility should not be shirked. Experienced crews under competent foremen can be expected to keep work moving forward in an orderly manner, but they are principally concerned with physical aspects of the job. They cannot substitute for management. Nor can they be expected to have advance knowledge of what the owner or general contractor plans. Keeping up-to-date on the over-all aspects of larger jobs is distinctly a function of management.

Consequently, we have tried to develop constant supervisory practices that tend to relieve our crews of this responsibility.

For example, when one of our estimators completes a take-off and estimate, he is not finished if we get the job. He visits the job two or three times a week and studies the way the job is progressing to see how it coincides with his estimate.

We have found this practice valuable to us for several reasons. The estimator can often see how a future estimate can be improved and, since competition for jobs is stiff, any increase in efficiency or method improvement can be valuable in future bids. He may see a different way to handle some of the work and he may discover a short-cut which would be found only as a result of these frequent visits.

One of his chief duties on such visits is to see that crews keep "just far enough" ahead of other crafts, and if he doesn't have the latest information on what others are doing or planning, he is the one man who can get this information most efficiently and relay it to the foreman.

Today, it is fairly easy to take off materials in making estimates, but it is extremely difficult to keep labor in line. Since labor costs compose one of the greater cost factors, it behooves us to provide the type of supervision that gives us efficient use of both our labor and experienced men at their highest skill without extra push or wasteful hurry. All in all, such supervision helps a job become profitable on our books.

Keeping work "just far enough" ahead of other crafts has proved a time saver, as well as a goodwill builder with everyone, including other craft contractors and owners. No one likes to be delayed because of others, saying nothing about savings in time and possible alteration costs.

In keeping with my supervision policy, I visit all jobs frequently. This provides me with a working knowledge of the job, which is important when discussing the work with other contractors or the owner, as well as in planning future jobs. It also has a beneficial effect on our whole organization, because they all know that none will be left to sweat-out problems alone, but that the whole organization, from top to bottom, can be expected to give the wheel a push, if needed.

Another phase of our supervision is the thorough inspection of all our jobs in final stage before calling in the official inspector. If any changes are required, they can be done while men, materials, and tools are on the job. The result is that we have virtually a record of 100 per cent acceptance when inspectors make final checks.

It boils down to the fact that no business will run itself. Management not only must provide supervision for its own protection, but because an organization likes to have competent supervision.

Compact, efficient organizations with good supervision attract the interest of contractors, prospective builders, and owners who know that only well-supervised organizations can do a job well—at competitive prices.

Detailed records improve bidding

By W. M. Massey

THE FIRM of Hutchens-McCaleb Co., Huntsville, Ala., specializes in industrial and commercial wiring with contracts scattered over various parts of Madison county. In order to keep tab on the various jobs, D. W. Koonce, assistant manager in charge of electrical contracting, devised an effective system with approval of Allen Mitchell, general manager of the firm. Two new forms were added, both standard 8½ x 11 size to fit in the job file.

One form is a daily work report which is filled out at end of each work day by the senior journeyman or foreman of each job. Labor costs for the day and materials used are entered after columns listing such items as conduit, cable, wire, fittings, etc., and space is left to fill in miscellaneous materials not listed in a column.

The other form is a simple graph which is prepared in outline on

Joseph P. Martien, vice president, and Harry E. Dodds (seated) of Martien Electric Co. check specifications for a new job. One of Cleveland's oldest and best-known electrical contractors, Martien Electric Co. celebrated its 50th anniversary June 8, 1956.

"There's a helpful difference in Day-Brite service"

"In renovating an older building recently, we needed a variety of lighting fixtures. Day-Brite supplied them all . . . on time and properly labeled . . . made our job coordination easy.

"The Day-Brite representative worked with our foreman, going over fixtures, identifying each type, saving us unwrapping and installation time.

"The final Day-Brite touch that made our job profitable was the ease of assembly and installation. Our electricians commented on how few miscellaneous parts were needed to install the fixtures.

"This is the kind of job that has made us partial to Day-Brite equipment and service for many years."

What about you? Isn't it time you let high-quality Day-Brite fixtures bring you consistently higher profits and better-satisfied customers?

71197

Certified Lighting for a Better America

DECIDEDLY BETTER
DAY-BRITE
Lighting Fixtures

Day-Brite Lighting, Inc.
5435 Bulwer Avenue
St. Louis 7, Missouri

NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

standard graph paper as soon as the contract is secured. The figures on labor and the various materials that went into making up the estimate for the job are outlined on the chart with pen and ink. When the job is underway and the daily work reports are coming in to office, the data is blocked in with blue crayon. This is done once a week to correspond with the payroll period. Any particular item that may run beyond the estimate is blocked in red beyond the estimate outline. Those items that run less than the estimate show up as unfilled space in the outline so that at end of any particular contract job a glance at the graph shows what items were over, what were under, and the amount they missed the estimate.

Mr. Koonce points out four main advantages of these two forms, namely:

1. A running inventory of the material on the job by comparing amount of material used with amount sent out according to the shipping tickets.

2. Somewhat of a check is provided on productivity of men on the job from day to day. When the forms were put into use the men were told, however, that they were not designed as a check on them but as an over-all record of the job.

3. A job estimate check for reference in figuring future jobs that might be similar. Reference to the charts quickly shows accuracy or lack of it in original estimate.

4. Up-to-date figures are provided for percentage accounting on jobs calling for partial payments based on percentage of completion.

Actually, according to Mr. Koonce, the forms have proved to be a time saver for him. He can keep records of a job up-to-date in less time than he can travel to and from the job for a personal check on it thus cutting down on number of visits and allowing more time for trouble shooting where needed.

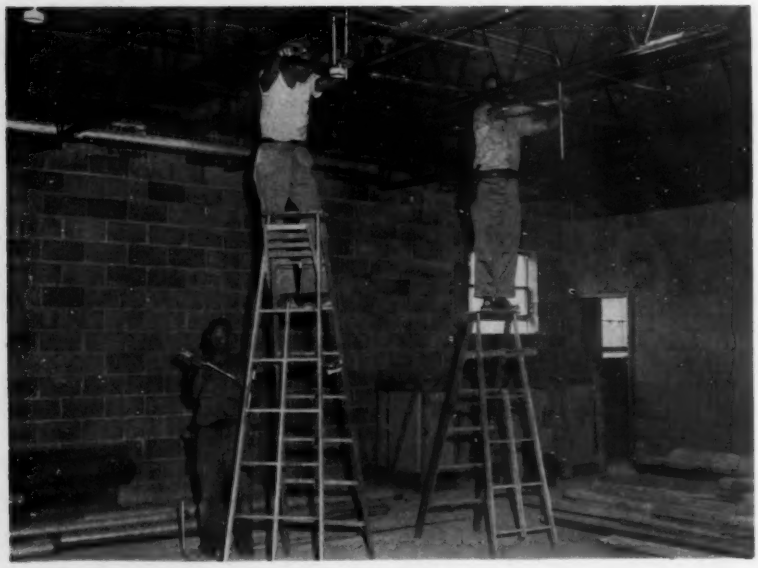
The foreman usually fills out his daily job report form as he checks over the job while his men are gathering and checking tools. Little time is actually lost on account of record keeping that may save the firm large sums on future estimates, or enables them to uncover efficiencies or short cuts that might go unnoticed otherwise.

Industrial maintenance proves profitable

By Frank T. Humphrey
Secretary-Treasurer
Harrisonburg Elec. Supply Co.
Harrisonburg, Va.

◆ SERVICE has been the heart of our business. The maintenance of electrical service for residential, commercial, and industrial accounts has built our business to the point where volume trebled last year over '54, and is expanding to a fivefold increase this year over '56.

Service furnishes a steady source of income. It leads to bigger jobs within a plant. Having a shop setup to followup an installation with maintenance builds a company's reputation. It recommends itself to an industrial plant since it saves the expenditure of an on-the-job maintenance man.



Electricians of Harrisonburg Electric Supply Co., of Harrisonburg, Va., install conduit in commercial building—typical of the new work that comes to this organization as a result of the reputation it has built up through its industrial maintenance service.

A few years ago when we sought new business, we solicited industrial accounts in the area. Approaching the feed mills, poultry packing plants, creameries and milk producers, we inquired whether they had any breakdowns, whether they would not put our name on record in the event of an emergency. We pointed up the advantages we had to offer: a 24-hour emergency service including nights, Sundays and holidays.

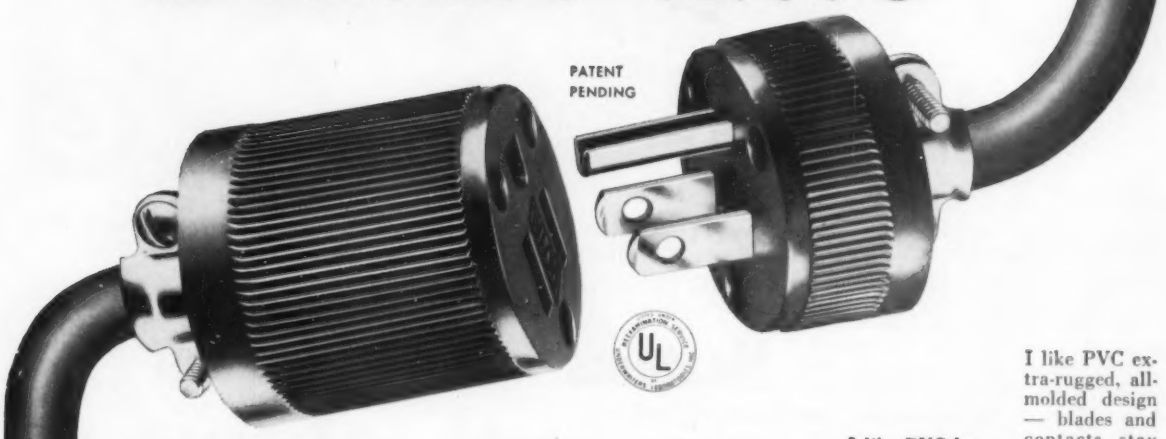
Since some plants were in operation 24 hours a day, the advantage of maintenance service always on tap was readily recognized. Moreover, during peak seasons in certain industries such as poultry packing, keeping machines in steady operation is a vital necessity. Breakdowns could cause heavy losses.

Verbal arrangements were made. Preventive maintenance was not introduced; there was no agreement to do monthly or yearly surveys. However, we were to be on the job if a call for service came.

Calls did start coming in. There was a motor burn-out, and we had

ROYAL PVC HEAVY DUTY CAPS AND CONNECTORS HAVE WINNING WAYS

PATENT PENDING



I like PVC dead front caps—no exposed wires to worry about — no bothersome fiber washers.

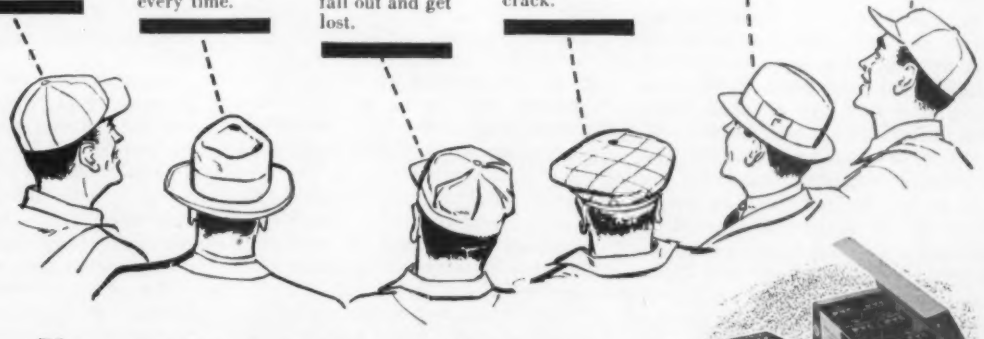
I like PVC for safety — I get better, safer, cleaner wiring every time.

I like PVC one-piece connectors — no loose eyelets or rivets — no screws to fall out and get lost.

I like PVC all-vinyl construction — they'll take a lot of abuse, but won't break, won't chip or crack.

I like PVC because they save my time — fastest, easiest wiring I ever saw!

I like PVC extra-rugged, all-molded design — blades and contacts stay put — never wobble or work loose.



Yes, the electrical trade is going for Royal PVC in a big way — the greatest engineering advance in caps and connectors in years!

FREE SAMPLE — Write on company letterhead for FREE SAMPLE today!

ROYAL ELECTRIC CORPORATION
an associate of International Telephone and Telegraph Corporation
PAWTUCKET • RHODE ISLAND

ROYAL ELECTRIC
AN ASSOCIATE OF ITT

to rewind the motor. An overloaded circuit was taken care of by breaking up the circuit. In another case where there was an overload, we installed a new circuit. The Milk Producers' plant sent in an emergency call when their service burned up from an overload.

Here we replaced the entire service increasing capacity by 50% to take care of future additions in operation. We ran temporary power during the emergency putting the plant back into complete operation within six hours. The new service in this plant consisted of larger conduits, larger size wires to bring them up to larger size capacity.

Doubles capacity

When the feed mill added new equipment, the horsepower load jumped considerably. In this instance we put another service right alongside the one they already had, doubling capacity.

We have since added a motor shop to take care of the needs of our industrial accounts. We formerly sent motor rewinds out to other shops. We have built up an inventory to $20,000 and can now work right out of our shop with a stock that includes conduits, wire, safety switches, magnetic starters, etc. Formerly the number of runs we had to make to our distributor added to our cost and lowered our profit.

Our accounts are billed by the hour and list price for materials per job. Service work is paid on straight time but night work, Sundays and holidays is paid time-and-a-half plus materials.

There are many contractors who specialize in installations and are not set up for service. The president of our company, Marion G. Newman, Jr., and I look up maintenance as a necessary and fruitful follow-through that yields not only a steady and growing income but a source of new work. The quality of our workmanship, the reputation we have gained for dependability in an emergency, keeps us working at capacity now throughout the year.

We no longer have to go out and solicit business. It comes to us from miles around. We are often called upon to substitute for maintenance men at local plants where the home plant is located in some distant city. Reputation for efficient and economical handling now carries us along.

Owner Frank Anderson, of Illinois Electric Co., Hot Springs, Ark., values his wire rack as an aid to labor saving and efficiency.

Neatness in the workshop saves valuable manpower

By Frank Anderson
Owner
Illinois Electric Co.
Hot Springs, Ark.

◆ IN AN ELECTRICAL construction business like mine, which covers diverse operations from repairing and maintaining 3,000 industrial motors to wiring houses and repairing small electrical appliances, a large and crowded workshop area can be a place of confusion unless a program of orderliness is established.

One of the means for maintaining order that I value highly is the wiring rack that holds the reels of wire. We save many hours of time during the year with this rack, and much annoyance that would result if we had to hunt for the wire we need. Because three of my electricians are also trained to estimate, I feel that conserving manpower adds to both profits and efficiency.

The building which I planned and constructed for my varied operations puts a roof over everything. This is an excellent aid to maintaining orderliness. We cannot prevent floors and machinery from showing the effects of daily work but the entire crew cooperates to keep the premises as clean as possible.

Maintaining an orderly shop gives more floor space for storage and for moving about. This is important to us, for we use a great deal of labor-saving equipment — heavy cranes to pick up motors that need to be carried all over the shop, hand trucks, and other labor-saving devices.

We are fortunate in having a woman as an active member of personnel. My wife, who attends to the bookkeeping, also insists upon as much neatness as can be accomplished in an electrical construction shop that does heavy maintenance for mines and mills and also maintains a complete machine shop.

Having established a routine for keeping the premises as orderly as possible, with a training program among the men aimed at encouraging orderly habits, we automatically clean up as we work.

(Continued on page 122)

You get HIGHER CONDUCTIVITY with BLACKBURN SERVICE ENTRANCE SLEEVES

because Blackburn... and Blackburn alone... provides

GREATER CONTACT AREA where needed

Hole Depth Increases With Size of Conductor... thereby providing more contact area for the conductors being connected.

COLOR CODE	WIRE SIZE ACSR	WIRE SIZE AWG	HOLE DEPTH IN INCHES
Brown	–	8 sol — 10 str	.820
Green	–	6 sol — 8 str	.840
Blue	6	4 sol — 6 str	.860
Orange	4	2 sol — 4 str	.925
Red	2	1 sol — 2 str	1.010
Yellow	1/o	1/o str	1.185

The center stop in a Blackburn Sleeve is a solid barrier that assures proper distribution of the inhibitor around the conductors.

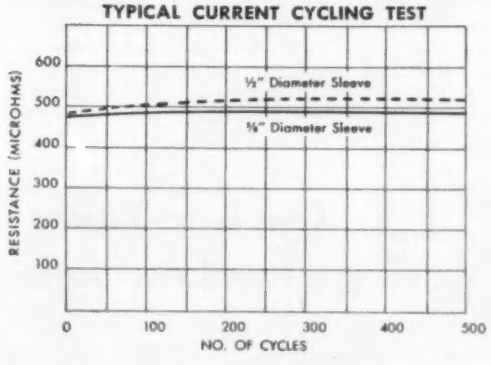
FIRST! Printed (not indented) permanent COLOR CODING *is easier to read*—makes size identification positive and quick.

FIRST! Aluminum Sensitized Tape seals the Blackburn Sleeve's ends. Easy to puncture... and, if a particle of the seal is pushed into the chamber, it is conductive.

FIRST! Each Blackburn Sleeve contains the superior Blackburn inhibitor, Contax, *in measured amount.* Won't squirt out on glove or in face.

LIVE BETTER ELECTRICALLY

Conductivity of Connection PROVED GREATER Than Equivalent Length of The Conductors Being Connected.



A series of typical current cycling tests were conducted with both ½" x ⅝" diameter BLACKBURN Sleeves. Note the lower resistance of Blackburn Sleeves as compared to the equivalent length of cable without any sleeve.

Test Conditions

Wire: 2 ACSR to 4 stranded copper
Current: 190 Amperes
Cycle: 2 Hrs. "On" 1 Hr. "Off"
Length of Connection: 24 inches
Curves represent an average of five tests
Resistance of equivalent length of wire: 527 Microhms

JASPER BLACKBURN CORPORATION, 1525 Woodson Rd., St. Louis 14, Mo. • WYdown 3-9430

Know the law

by Arthur L. H. Street

Arkansas court annuls law's penal provision

◆ ARKANSAS HAS a lien law like that in force in many other states, giving suppliers of labor or materials a mechanic's lien against property to the improvement of which they have contributed.

But, unlike such laws in many other states, the Arkansas statute stipulates that any original or principal contractor or his assignee who shall be paid the contract price or any portion thereof, and who shall fail or refuse to discharge the liens created by the section, to the extent of the contract price received by him, shall be deemed guilty of an offense and punishable. (If the amount received by the contractor exceeds $10, he is deemed guilty of a felony, and if less than $10, a misdemeanor.)

A general contractor was paid by the owner the full contract price, but failed to pay what he owed a subcontractor. He was prosecuted on the ground that his failure to pay was a violation of the statute, and was convicted and sentenced to a year's imprisonment. But he successfully appealed to the Arkansas Supreme Court on the ground that, because intent to defraud was not proved and was not required to be proved by the statute, his conviction was void and the law violated a clause of the Arkansas constitution which declared that no person could be imprisoned for debt except in cases of fraud.

The supreme court ruled that it was not difficult to imagine many situations in which a contractor might be prevented from paying the subcontractor or laborers even though he may have acted in good faith and without any intent to defraud anyone, yet, under the wording of the statute, he could be convicted of a felony. (297 S.W. 2d 775)

The court approved what was said by California and Minnesota appellate courts in adjudging similar statutes to be unconstitutional. (Later the Minnesota legislature and, possibly, the California legislature, remedied the constitutional defect by making *intent* to defraud an element of the offense.

The California court ruled that the legislature had no power to provide that a contractor who breached his agreement to pay a certain class of debts with his own money should, for that reason alone, be deemed guilty of a crime punishable with imprisonment.

The Minnesota law was held to be unconstitutional because, as the supreme court pointed out, it was not necessary that a contractor be guilty of any fraud or other tort (wrong) in order to subject him to the penalties of the section. Were he to receive his pay from the owner of the property, and to owe a debt due on contract to one of his laborers or material-men which he was unable to pay, he would be guilty of obtaining money on false pretenses, and liable to imprisonment in the penitentiary.

No matter how honestly he may have paid over the last dollar which he had received on his contract, yet if, through honest mistake, he took the job too cheap, or if by unforeseen accident it cost more than he anticipated, and for that reason he could not pay all that he owed for labor or material, he would be a felon. This, the court emphasized, would be returning with a vengeance to the old barbarous fiction upon which imprisonment for debt was originally based.

Court favors illiterate in mental shock incident

THE PROBLEM: An illiterate laborer sustained only slight physical injury when an electrical shock passed through his body as he held a dragline and a boom contacted an overhead high tension wire. The current passed through his body from his right hand, making an exit from his left foot. The principal, temporary injury was purely mental and stemmed from his notion that the shock was a form of supernatural warning or punishment. He interpreted it as an act of God, indicating the displeasure of the Lord. He concluded that by this accident, God had delivered him into the hands of the devil. Was he entitled to an award of workmen's compensation on a theory of temporary total disability?

COURT'S ANSWER: Yes. The Florida Supreme Court reasoned that a settlement of the litigation favoring the injured man would indicate to him "that God had overthrown the devil and again aligned himself on" the injured man's side. (Moses v. R. H. Wright & Son, 90 So. 2d 330.)

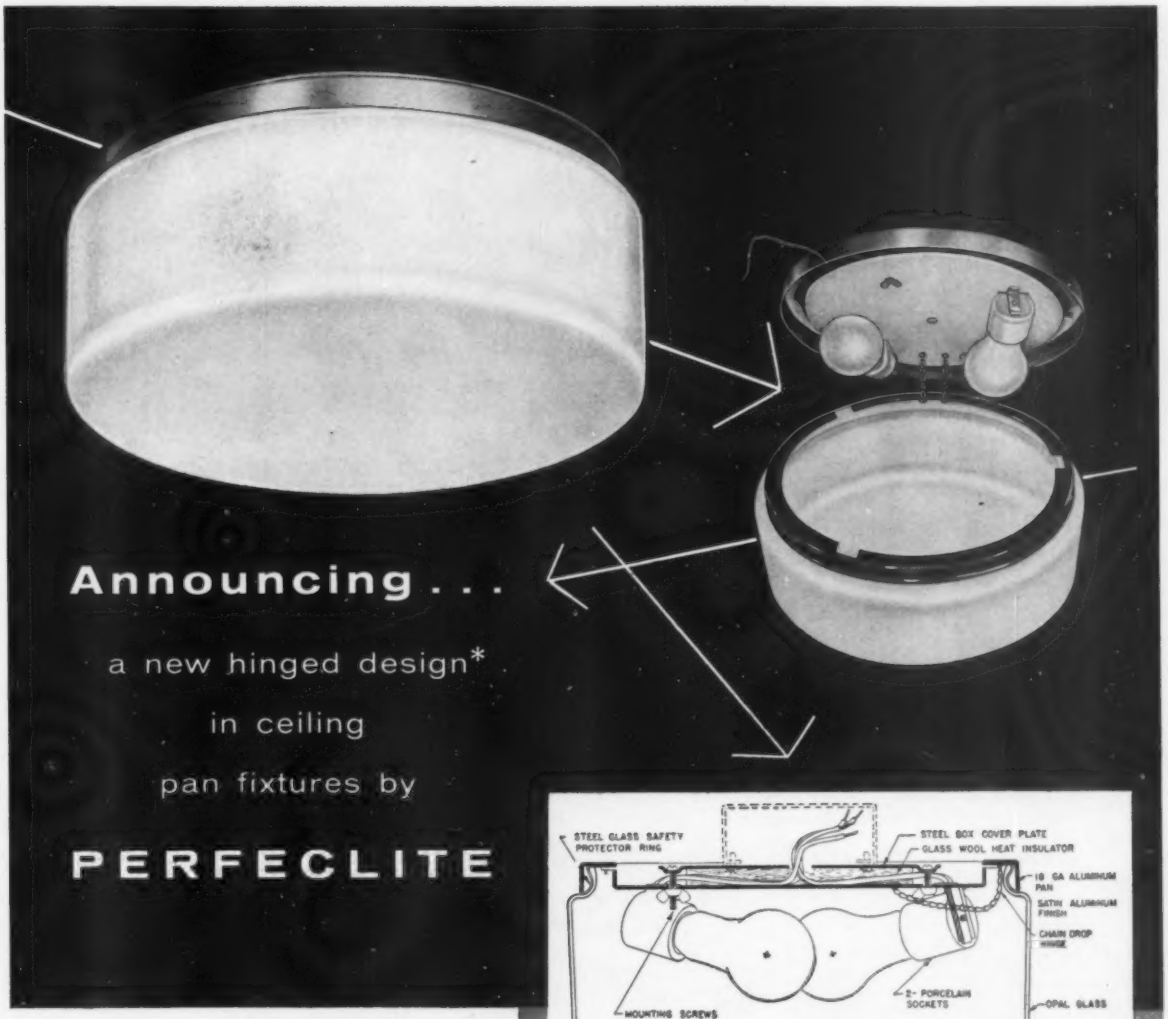
Material suppliers had no lien right

THE PROBLEM: In Arkansas a building contractor abandoned a job before it had been substantially completed. At that time $1,089 was due the contractor for work done, but it cost the owner more than that much to have the work completed by another contractor. Plaintiffs furnished materials used by the first contractor but not paid for. They had filed proper affidavits under the mechanics lien law. Were the liens enforceable against the owner?

COURT'S ANSWER: No. So decided the Texas Court of Civil Appeals, Waco, in the case of Harris v. Interstate Lumber Co., 303 S. W. 2d 950.

The decision is obviously influenced by the idea that, ordinarily, a construction job is finished by the original general contractor. That enables the owner to hold back payments from the contractor until lien claims are satisfied. But when the contractor abandons the job in a substantially uncom-

(Continued on page 123)



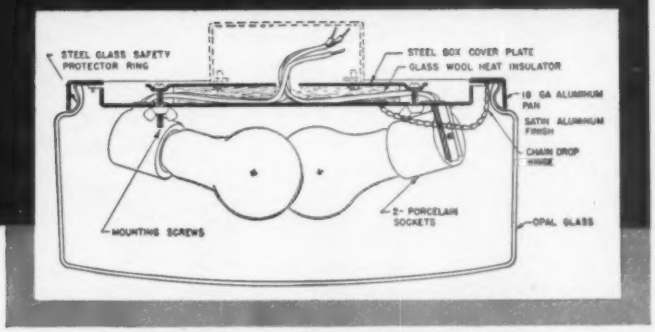
Announcing . . .

a new hinged design*

in ceiling

pan fixtures by

PERFECLITE



Perfeclite now offers a new **hammer lock** design in incandescent ceiling pan lighting fixtures. No other ceiling pan fixture on the market today has all these engineering features:

- Globe opens on **hinge** for quick easy cleaning and relamping.
- Unique **safety locking fitter** holds globe in place without bothersome screws, unsightly extensions or trick springs. Globe is secured with lugs by simple twist of the wrist.
- Lip of globe is completely protected against breakage by a **steel protector ring.**
- Provides **ceiling illumination** as well as **evenly distributed floor lighting.**
- Minimum amount of metal, maximum amount of glass results in **highest light efficiency.**

Here is a unique ceiling pan fixture design for either commercial or residential installation. For further information fill in and mail the attached coupon today.

Perfeclite's new **hammer lock** fixture is available in the following sizes:

Model	Glass Diameter	Wattage
HH-9	8"	2- 40 W
HH-11	10"	2- 60 W
HH-13	12"	2- 75 W
HH-15	14"	2-100 W
HH-17	16"	3-100 W

Southern Representatives

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W. J. Milner Co.
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New Orleans, Louisiana

Fixtures are Underwriters Laboratories, Inc. approved.

*Patent pending

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Gentlemen:

Please send me The Perfeclite Data Sheet 56-C

Name.....

Address.....

City.....State.....

PERFECLITE PRODUCTS
THE MARK OF LIGHTING SERVICE

AN IDEA PIONEERED BY

DUNCAN

Duncan pioneered the Class 200 rating with the "Extended Range" Type MF-SE meter introduced eight years ago. This "50 amp" singlephase meter provided capacity to 200 amps. Within two years, Duncan also made 200 amp "extended range" capacity available in the Type MH polyphase meter.

TYPE MF-SE (1949)

CLASS 200 RATINGS

for More "Housepower!"

30 AMP.

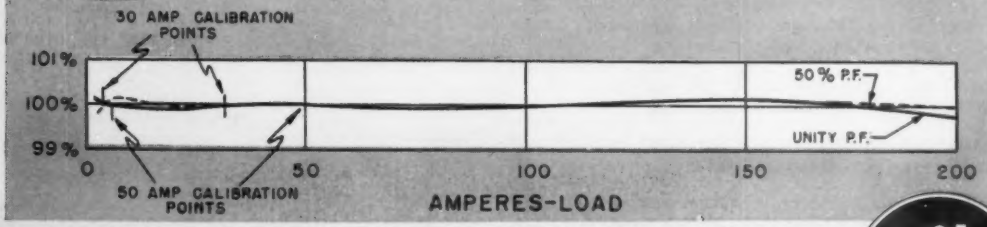
50 AMP.

TYPE MK

The Duncan Type MK Class 200 meter is the latest of the improved singlephase MK line, built to accurately meter a wide range of loads from a few watts to the meter's full 200 ampere capacity. Arc-resistant insulation in the electromagnet, self-contained arc gaps to by-pass electrical disturbances, and Alnico V permanent magnets to maintain calibration stability are just a few of the MK features in this meter.

This meter also offers excellent performance. Note the "straight line" load curves in diagram below. Meters are available with test ampere ratings of both 30 and 50 amperes, starting watts 24 and 36, respectively.

Duncan offers "Meters to Meet Your Requirements", with field engineers and representatives serving all areas of the country. Quick delivery from finished stocks. TRY DUNCAN SERVICE!



DUNCAN ELECTRIC CO., INC., LAFAYETTE, INDIANA

LIVE BETTER ELECTRICALLY WITH FULL HOUSEPOWER

Capacitor installations are plan- clock controls. In addition, 116 locations added capacity was ob-

Utility Engineers' Forum

Design
Installation
Testing
Maintenance

Distribution modernization

What Southern and Southwestern electric utility companies are doing to meet problems arising from rapid load growth

15,300 transformers added in "crash" test program

By E. A. Fisher
Asst. Distribution Engineer
Union Electric Co.
St. Louis, Mo.

◆ THE PEAK DEMAND on the Union Electric System increases at an annual rate of about 8 percent. The peak for this year, which occurred in July, was 1605 MW, an increase of 125 MW over the 1956 maximum of 1480 MW.

Prior to 1952, our system peaks occurred in the winter, usually in December. Since that time, because of the growth of air-conditioning loads, the peaks have accurred in summer, usually in July.

The combination of heavy air-conditioning loads and high ambient temperatures resulted in a large increase in distribution transformer failures and circuit tripouts which became so serious by 1954 that a "crash" program of transformer replacements and circuit reinforcements was initiated in September of that year. This program was based on the premise that we should provide capacity in the average transformer for at least five years' load growth.

Transformers were tested with Max-i-meters or if tests not more than five years old were available, they were adjusted by adding 6% for basic growth per year. To this value, one kva per residential customer was added if the test was made during hot weather or 1½ kva per customer if the load test was made during cool weather. In very low income areas, the above additions were reduced to .4 kva and .6 kva respectively per customer. If the value resulting from the foregoing computations exceeded 110% of the transformer rating, a larger transformer was installed or the secondary was split and an additional transformer installed.

This program, which has just been completed, resulted in the installation of 15,300 distirbution transformers totaling 492,000 kva and the removal of 8,700 transformers totaling 165,000 kva. Transformer burnouts and CSP tripouts decreased from 151 and 428 respectively in 1954 to 12 and 100 respectively in 1957 to date, indicating the program has proved successful.

For new subdivisions, our method of calculating transformer capacity usually results in an allowance of approximately 3 kva per customer plus 1 kva per hp for known air-conditioning units of 2 hp or larger.

We have not installed any overhead secondary networks or banked secondary systems and none are contemplated. The downtown area of St. Louis is supplied by two underground 120/208 volt network systems served through 13.8 KV cable circuits from two network substations. The combined demand of the two areas was 97,000 kva during the 1957 summer peak and about 53,000 kva during the past winter peak.

A third network substation with a capacity of 90,000 kva is planned for 1959 to relieve impending overloads on the two existing network supply sources. The network areas will be rearranged into three systems with loads apportioned to the capacity of each supply system.

Capacitor installations are planned at the rate of about ½ kvar per kw load increase on the Union Electric System. To date, we have installed 412 mvar of pole type capacitors of which 228 mvar are switched, practically all by time clock controls. In addition, 116 mvar of switched banks have been installed on 4 kv, 12 kv and 34 kv substation buses. The capacitor total is therefore approaching 1/3 kvar per kw of system peak demand.

Summer test program shows where capacity is needed

By A. B. Weaver
Chief Distribution Engineer
Central Power and Light Co.,
Corpus Christi, Texas

◆ THE CENTRAL Power and Light Company serves over 230,000 customers in an area of 43,700 square miles in the southern tip of Texas. The area has been growing rapidly since the end of World War II. The annual rate of increase for the past five years has been from 13 to 15%. Some special areas have increased as much as 30%.

The Engineering Department has a Planning Committee with representatives from the production, transmission, and distribution sections. The purpose of the committee is to study the trends of load growth and, in cooperation with other departments and districts, with plans for increasing capacity to handle the expected loads.

It has been the policy for several years to include considerable spare capacity in feeders, laterals, transformers and secondaries but load growth has exceeded the spare capacity in many locations. In those locations, added capacity was obtained by installing additional transformers and cutting the secondary runs or by enlarging the transformer size. Some additional capacity is also obtained by improving the power factor by the installation of primary and secondary capacitors. All secondary capacitors are fixed but primary capacitors are fixed, seasonally switched, and daily switched by time or voltage.

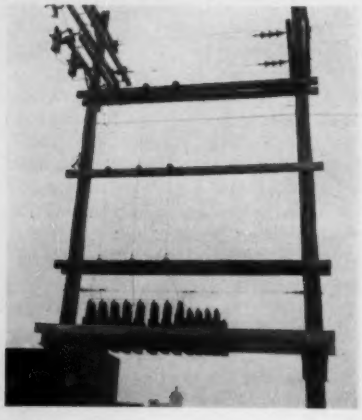
The Central Power and Light area started exepriencing overload conditions due to air conditioning several years ago and a program of conversion from 2400 volt to 12.5 kv was in progress at the time, which made it economical to build for the future. That program has been a great help in keeping up with the load growth.

Up until recently, overloads were detected from low voltage complaints and transformer fuse failures. For the past two summers, a program has been established to make kw and kvar tests on each substation and also on each feeder to provide information for determining where additional capacity will be required. Indicating ammeters are used to check load on laterals and transformers. In some residential areas, checks are made of each customers demand where demand meters are used.

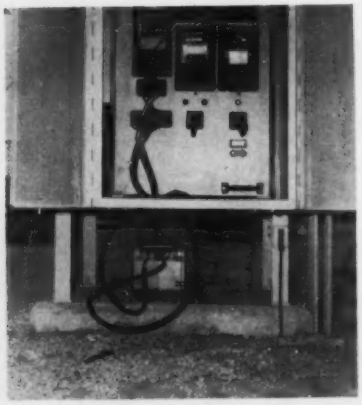
Three of the larger cities, including Corpus Christi, operate underground networks and during the past spring, each secondary network was set up on a board at the Texas A & M College to study loadings in order to determine voltage and local conditions. The studies are being used to plan new transformer loactions and primary and secondary extensions.

The distribution systems are served from 138 kv and 69 kv to 12.5 kv substations fith a few small 69/2.4 kv stations and also a few 12.5/2.4 stations. Only about 10 or 15% of load is served at the lower primary voltage. The present plans do no include voltages above 12.5 kv for primary feeders.

The distribution engineering section, including the seven district engineers, acts as a Standards Committee to establish distribution standards. The cost of materials and equipment is given consideration in setting standards but with material, equipment and labor costs continually increasing it would be more accurate to refer to minimizing increased costs rather than reducing costs.



Both secondary and primary capacitors have been used to some extent for alleviating overload conditions. Above is a view of a 600 kvar switched bank mounted on a single pole; below is a similar bank on a 2-pole rack.



Kw and kvar recorders for portable use prove helpful in making load tests on system. Here a recorder is shown with test plugs attached.

Conversion to higher feeder voltage meets load increase

By John P. Lozes
New Orleans Public Service Inc.
New Orleans, La.

◆ To MEET an annual load increase averaging eleven per cent, an important change has been made in the overhead distribution system of New Orleans Public Services Inc. This change, utilizing the principle that basically the same copper can serve higher loads if it is operated at higher voltages, has been the 4,000 volt to 13,800 volt conversion program instituted in 1946.

Feeder areas shrink

This program was initiated under the concept that the extremities of the 4,000 volt feeders would be converted to 13,800 volt operation, with the 4,000 volt feeder areas shrinking as the load density increased. Thus, effectively, the load increase would be taken on the 13,800 volt system, and yet much of the 4,000 volt equipment kept in service until its normal life is expended. The effectiveness of this program can be seen in accompanying tabulation.

To improve the reliability of the 13,800 volt distribution system in a high isoceraunic area, a program of static-wire shielding has been instituted in which the common neutral wire has been raised to ridge position above primary wires and additional ground leads installed. On new construction, taller poles are used to allow the neutral to be raised to an effective level. On old construction a "bayonet" arm is bolted to the top of the pole to give the extra height.

Capacitor use increased

Other help in carrying the larger loads has been the increased use of secondary, primary switched, and primary unswitched capacitors. These units have been used to reduce circuit loadings and to improve voltage regulation. Many of the primary capacitors, as well as transformers, have been installed on "cluster-racks," to keep costs down and to better utilize pole space.

Of improtance in carrying higher loads is a thorough knowledge of load conditions. The radial design of the overhead distribution system in New Orleans allows much of this knowledge to be gained from the daily substation feeder logs. In addition, a large number of the distribution transformers are tested each year by a one-day installation of Max-i-meters on the transformer secondary terminals during the peak load season. This allows time for relief to be given to transformers before dangerous overload conditions develop.

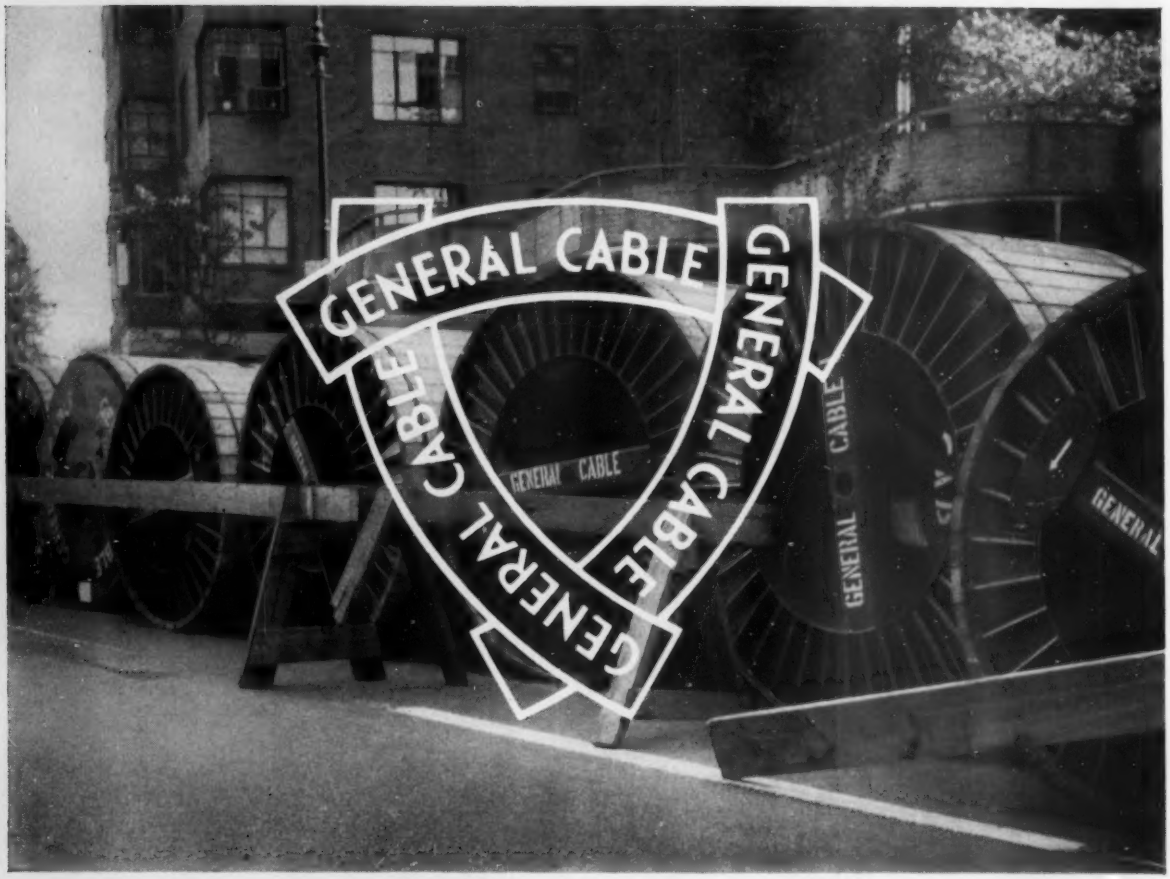
Comparison of electric distribution system* characteristics before and after 4 kv/13.8 kv conversion program

	1945	1957	% Increase
Distribution system* peak load	65,000 kw	230,000 kw	250%
No. of customers	118,000	170,000	44%
Load on 13.8 kv system, percent of total load	7%	92%	—
No. of distribution circuits	57	86	51%
No. of major substations	8	10	25%
Overhead distribution conductor wire miles (primary and secondary)	3,500	4,400	25%

* Excludes a-c secondary network system, underground.

Typical New Orleans distribution line after conversion from 4 kv to 13.8 kv, showing secondary capacitors and neutral used as a shield wire.

GENERAL CABLE BACKS YOU UP



on the job

AVAILABILITY: Immediate delivery everywhere, through over 500 Authorized Distributors, backed up by complete inventories of wire and cable in all the General Cable Distributing Centers.

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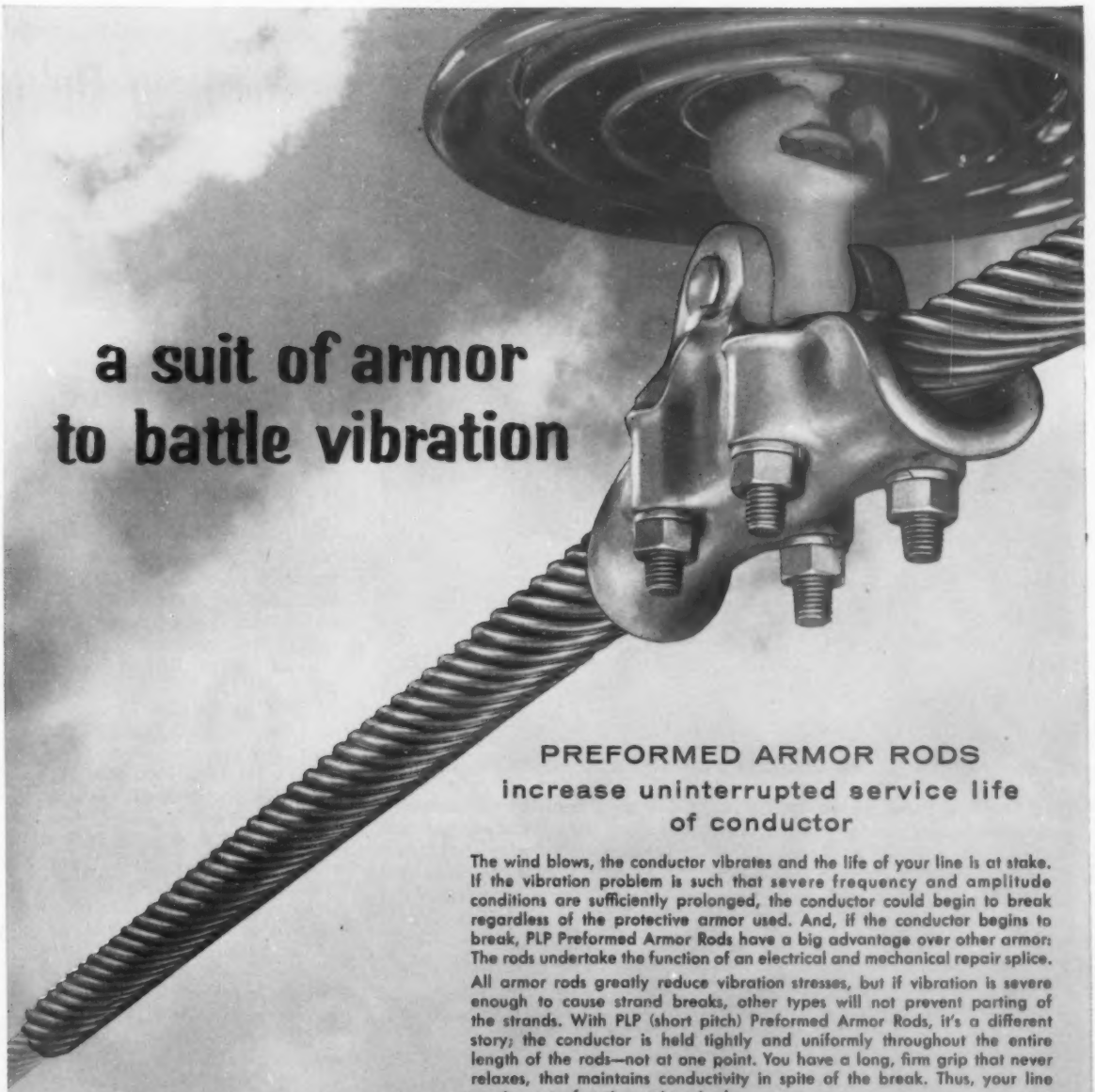


a suit of armor to battle vibration

PREFORMED ARMOR RODS increase uninterrupted service life of conductor

The wind blows, the conductor vibrates and the life of your line is at stake. If the vibration problem is such that severe frequency and amplitude conditions are sufficiently prolonged, the conductor could begin to break regardless of the protective armor used. And, if the conductor begins to break, PLP Preformed Armor Rods have a big advantage over other armor: The rods undertake the function of an electrical and mechanical repair splice.

All armor rods greatly reduce vibration stresses, but if vibration is severe enough to cause strand breaks, other types will not prevent parting of the strands. With PLP (short pitch) Preformed Armor Rods, it's a different story; the conductor is held tightly and uniformly throughout the entire length of the rods—not at one point. You have a long, firm grip that never relaxes, that maintains conductivity in spite of the break. Thus, your line continues to function unimpaired.

There is one other Preformed advantage to keep in mind. Some types of armor require the use of bolted end-clamps that can shake loose and cause chafing. Preformed Armor Rods require no end-clamps.

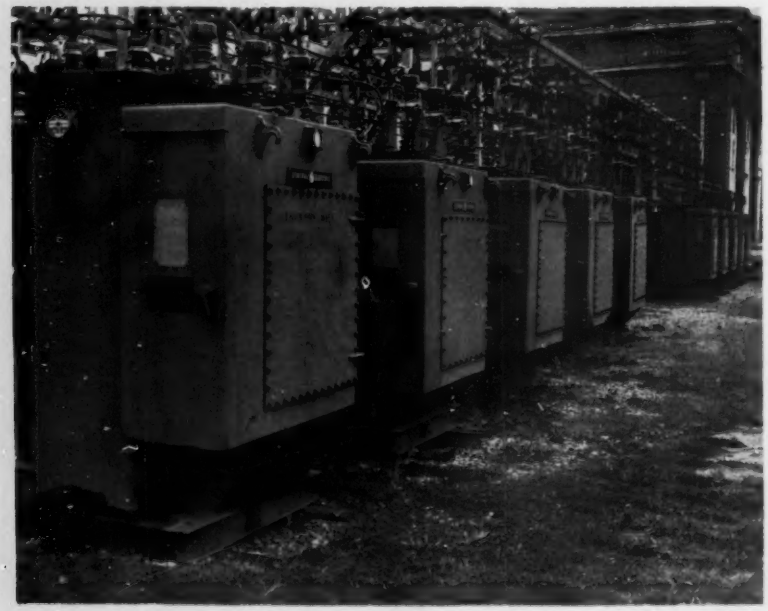
For a long uninterrupted service life, Preformed Armor Rods are the best suit of armor your conductor can wear. PREFORMED LINE PRODUCTS COMPANY, 5349 St. Clair Avenue, Cleveland 3, Ohio. Cable Address: Preformed-Cleveland . . . in 10 years the leading manufacturer of armor rods, dead-ends, Guy-Grip dead-ends and other line accessories.

PLP

You can look up to **Preformed**

Made in accordance with or for use under U. S. Patent Nos. 2,609,653; 2,275,019 and 2,587,521. Other patents pending.

This 500 kva three phase 22,900-208/120 v wye transformer serves a nearby shopping center; 18 kv valve arresters with external gap are mounted on transformer tank adjacent to bushing. Switching center at rear contains metering equipment. Knife disconnects are mounted ahead of a set of liquid power fuses on top of pole (not shown).



Many distribution circuits are presently regulated by three-phase step-type regulators as in this 2.4/4.16 kv substation.

How Duke

By Frank W. Edwards

Distribution Design Engineer
Duke Power Company
Charlotte, N. C.

◆ IN THE PERIOD following World War II, Duke Power Company, like so many of its sister utilities, found itself faced with considerable expansion of its distribution system. In order to meet the rising costs that existed during this expansion, it was necessary that many innovations, economies and new techniques be incorporated into the distribution plant. It has been a challenge to the company to provide quality service without additional cost to the consumer.

Load on the distribution ssytem from 1945 to 1956 increased from 257,000 kwd (326,075 customers) to 1,000,000 kwd (635,530 customers), and the kwh usage increased from 1.1 billion kwh to 4.6 billion kwh. This represents an average kwd increase of 13.3 per cent per year and an average kwh increase of 14.2 per year. The 1956 distribution system kw demand was approximately 49 per cent of the total system kw demand.

The average 1956 kwh usage of the residential customer was 4,323, which represented an increase of 321 kwh over the 1955 usage.

While the spread between the winter and summer peaks has decreased somewhat over the past few years, the distribution winter peak still exceeds the summer peak on all substations except those serving concentrated air conditioning loads in downtown business areas.

Planning for load growth

In estimating load growth, past and present load growth figures are used. These figures are extended to a 5-year or a 10-year level with allowances made for abnormal or subnormal estimated growth. Periodically, the estimated load growth is compared to actual load growth and adjustments made in the planning accordingly. To keep informed on the load growth, thermal demand ammeters have been installed in each phase of

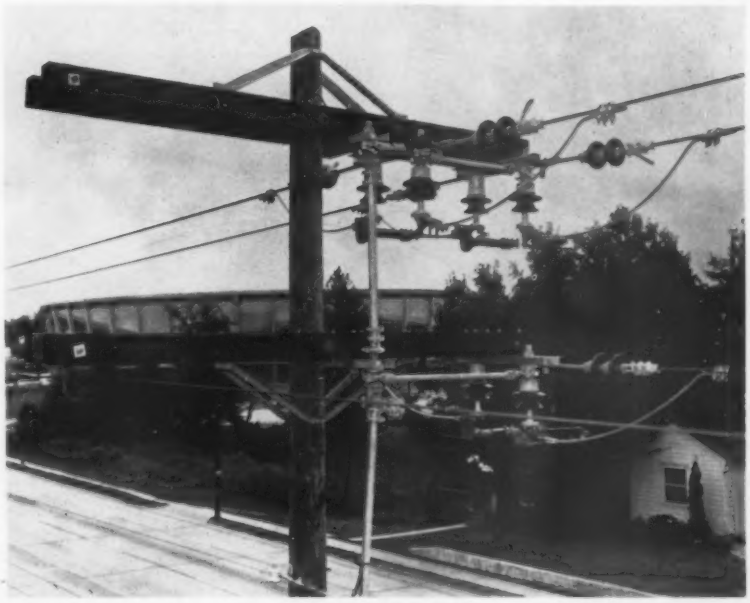
How the Nepco Process

meets system load growth demand

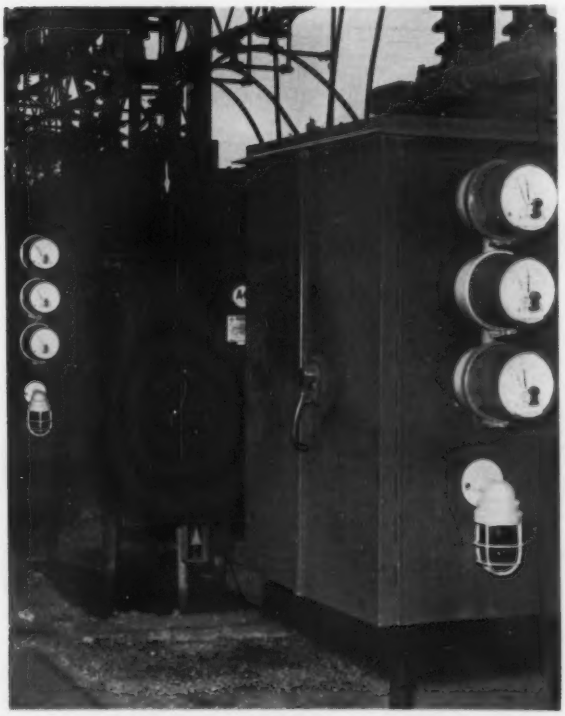
each individual distribution circuit and a kilowatt demand meter installed on the transformer bank in the substation. On older installations, the ammeters were mounted externally on the housing of the oil circuit breaker. On newer installations, the ammeters are bought builtin. From monthly readings of the meters and from occasional voltage and ammeter readings on the circuit, the adequacy of the substation service area can be determined.

By keeping abreast of the load growth within a substation area, the need of additional substations can be determined. New lines in the area of the proposed substation are then designed for this future condition. In some instances, the necessary rights-of-way and property are purchased in advance of the time they will be required.

In a great many of the urban and suburban areas within our sys-



Load break switch installation on 7.2/12.5 kv circuit.

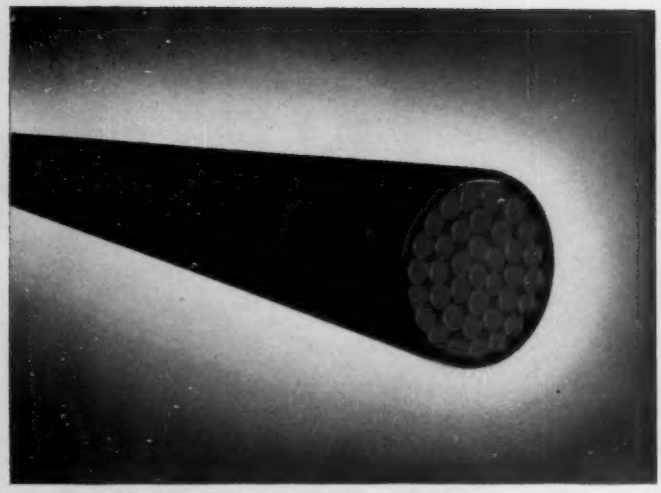


On older installations (above), thermal demand ammeters were mounted externally on control cabinet of oil circuit breaker. Ammeters are built into purchased unit on newer installations, at right.

Butyl rubber has inherent characteristics that make it an ideal insulating material for high temperature,

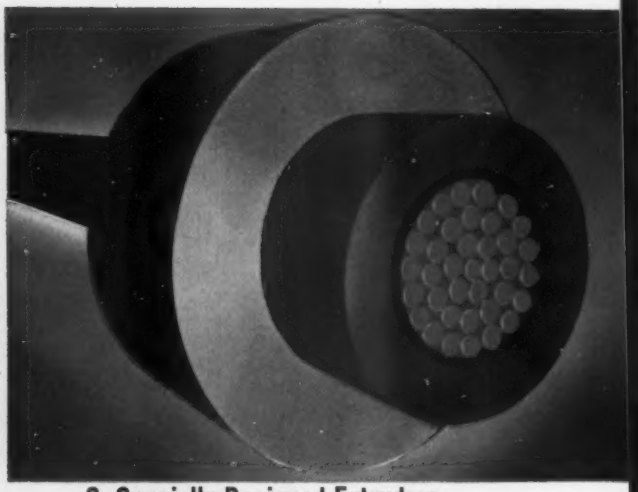
quires special know-how and special equipment on the part of the wire and cable manufacturer. Here are eight

How the Nepco Process makes Butyl better



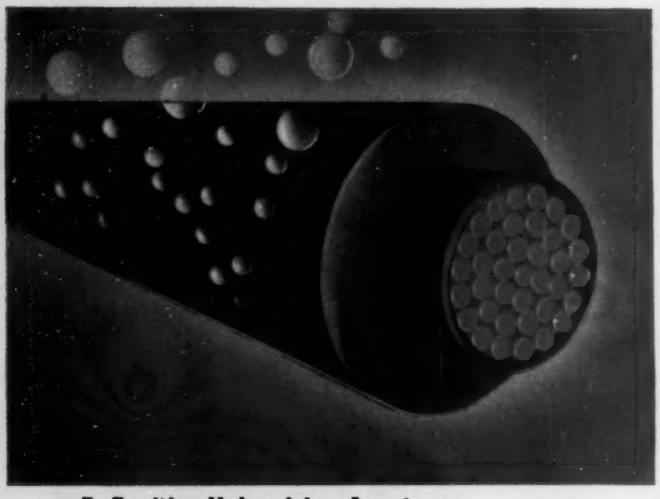
1. Vacuum Chamber Core Cleaning

All cores or copper stranding which in high voltage applications is normally wrapped in a special semi-conducting impregnated tape is passed through a high vacuum chamber to "boil-off" absorbed gases and moisture from the core.



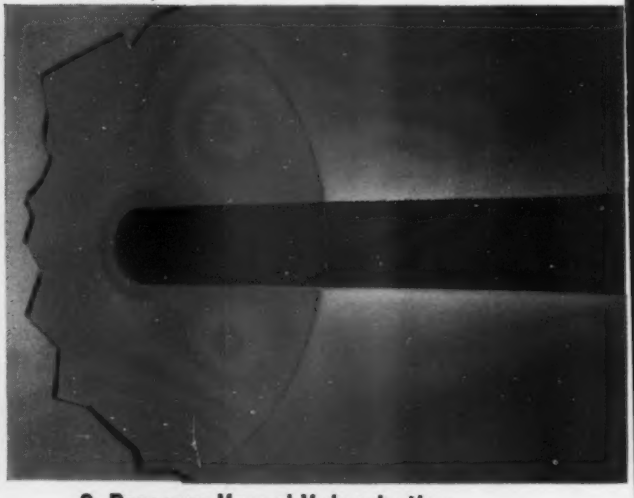
2. Specially Designed Extruders

After investigation, NE selected extrusion as the best method of applying a reliable dense, uniform insulation without troublesome interfaces. Since standard extruders were erratic in their capacity to process Butyl rubber, NE installed new equipment specifically designed to slowly work Butyl rubber at its optimum consistency.



5. Fugitive Vulcanizing Agents

Vulcanizing agents that leave the by-products of the vulcanizing action in the insulation reduce cable service life and electrical stability. NE has developed fugitive vulcanizing agents with volatile decomposition by-products that can be eliminated from the cable construction.



6. Pressure Vessel Vulcanization

NE Butyl is continuously vulcanized at over 400 degrees in a specially designed 200 foot pressure vessel . . . long enough to permit thorough saturation of the reactive centers and to allow the Butyl to interbond with the semi-conducting strand shielding tape to form a continuous mass.

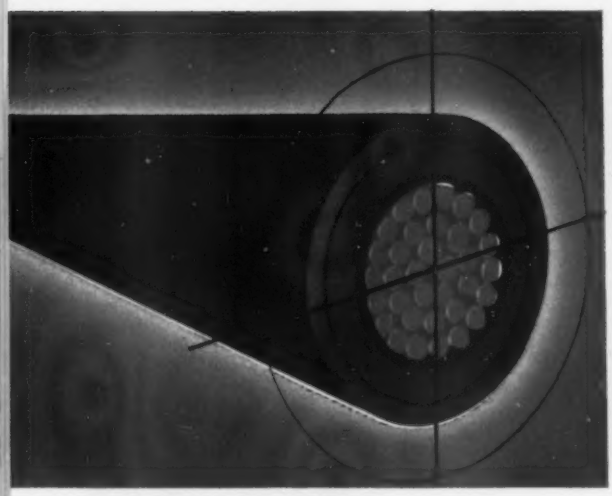
don't say any wire

Butyl rubber has inherent characteristics that make it an ideal insulating material for high temperature, high voltage wire and cable. It has outstanding resistance to heat, ozone and moisture.

To take full advantage of these characteristics requires special know-how and special equipment on the part of the wire and cable manufacturer. Here are eight things which National Electric does to get the best out of Butyl rubber and make NE Butyl insulated wire and cable the most dependable on the market.

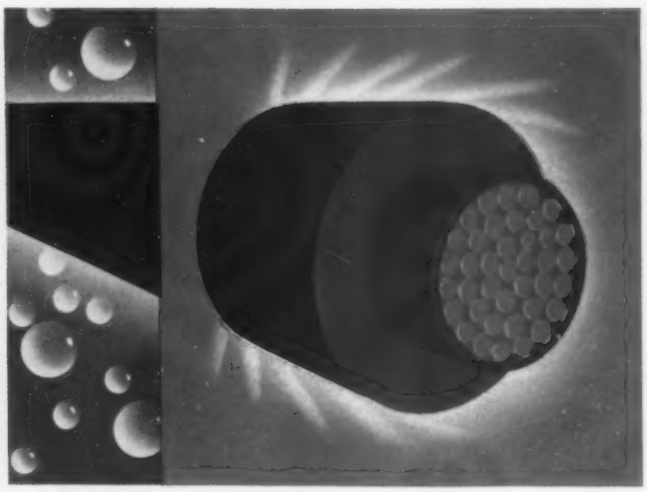
National Electric Products

Pittsburgh, Pa.: 2 Plants • 12 Warehouses • 41 Sales Offices



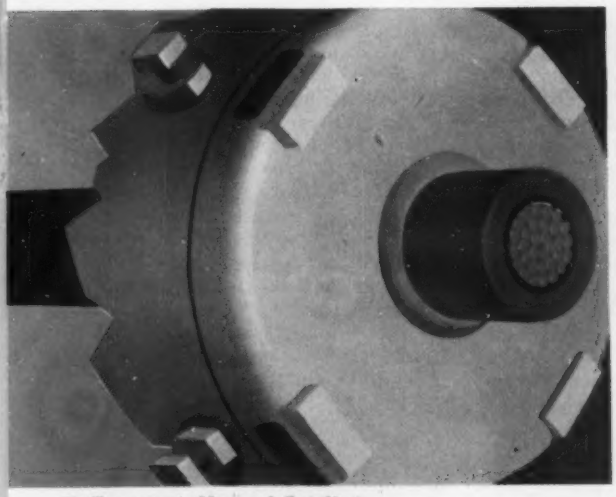
3. Controlled Concentricity

Every foot of cable is checked by a special monitoring station to maintain a perfectly centered core and uniform wall thickness before the material enters the vulcanizing chamber.



4. Water Cushion Processing

NE Butyl Rubber rides into the vulcanizing chamber through a high pressure water seal that molds the rubber uniformly onto the cable, impregnates the interstices of the shielding tape before vulcanization.



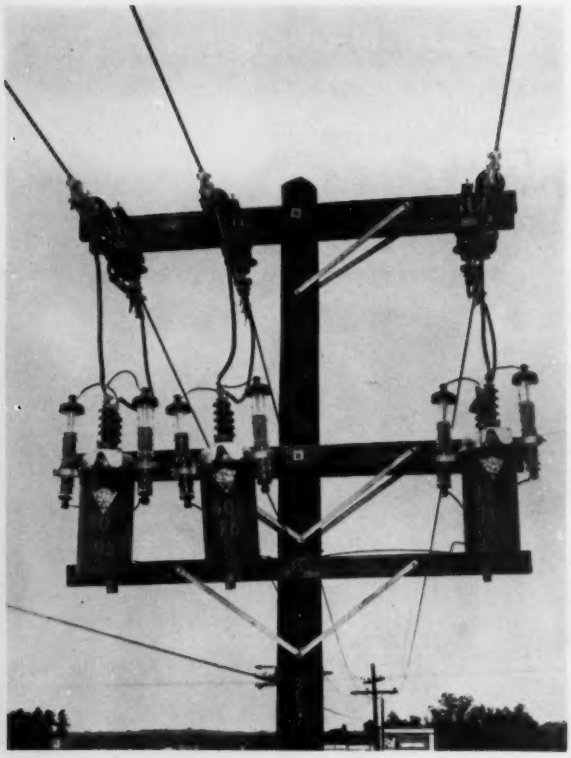
7. Pressure Vessel Cooling

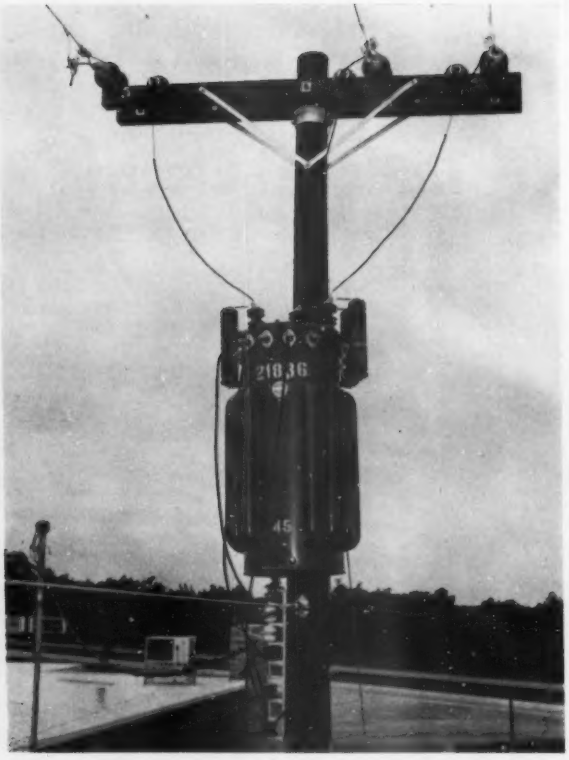
Perhaps the most important part of the Nepco process. NE Butyl insulated cable is slowly cooled in a second pressure vessel under the same pressure at which it was vulcanized. This cooling under high pressure forces gaseous by-products out of the insulation . . . permits the use of volatile vulcanizing agents which leave no harmful residuals behind.

The inherent inertness of the Butyl rubber polymer permits the insulation to be compounded and vulcanized to a much tougher and mechanically stronger material.

A typical National Electric Butyl formulation has at least twice the tensile strength specified for an oil base insulation and will maintain this margin of superiority during long term accelerated service tests. That's why when you plan to install Butyl rubber insulated wire and cable . . . don't say *any* wire . . . say NE Wire.

. . say NE wire





Increased load has brought a need for greater service continuity. Much improvement has been made by the proper installation and coordination of oil reclosers such as the one for a 7.2/12.5 kv circuit at left. The 12,470/120 v, 45 kva, three-phase, self-protecting wye transformer installation at right serves commercial customers. Service drop cable is quadruplexed 1/0 Al.; 9 kv valve arresters with external gap are mounted on transformer tank. No cluster mounted transformers have been installed to present date.

tem, lines have been converted from 2.4/4.16 kv to 7.2/12.5kv or 14.4/24.9 kv to take care of existing loads and provide for future growth. The 2.4/4.16 kv level has been restricted to serve within its capability only those areas immediately adjacent to the substation. Expansion of the 2.4/4.16 kv is not contemplated. In the downtown areas of two of the larger cities an underground, 12.5 kv radial system utilizing a throw-over scheme has been installed. No underground has been installed in residential areas.

Single phase is recommended for residential air-conditioning. Power loads are generally served at either 120/208 volts or 277/480 volts.

Service continuity

Along with the load increase has come a need for improved service continuity. Much improvement has been made by proper installation and coordination of station oil circuit breakers, oil circuit reclosers, and lateral fused cutouts on systems above 5 kv. As the higher voltage lines serve the larger service areas, reduction in outages on these lines has meant much both to customers and to the company.

Continuity has been improved by the installation of the phase thermal demand ammeters. The ammeter readings are periodically checked against breaker relay settings, and interruptions due to phase unbalance, overload, or change of load due to season are very uncommon.

Feeder ties between the more important circuits have improved service continuity. Load break switches are installed at various points in the feeders to allow transfer of load with minimum interruption.

Company crews have been instructed in the use of "hot line" tools so that most line work is done without service interruption. On occasion, it is necessary to schedule an outage when work is being done in the substation. Although no time for the outage is acceptable to everyone concerned, the least critical time is chosen and the customers most affected are notified of this scheduled time.

Regular line maintenance, a regular tree clearance program, and periodic maintenance and inspection of reclosers and line equipment reduce the number of service outages. Proper tree clearance is obtained for all new lines before construction. A storm procedure program has been devised for the system in the event of a large number of outages due to lightning, hurricanes or tornadoes.

Quality of service

Many distribution circuts are presently regulated by three-phase, step-type regulators in the substation. To correct excessive voltage drop on an existing line, an installation consisting of single phase, pole-type regulators and/or capacitors is often made rather than increase conductor size or build an additional feeder. Primary shunt capacitors in three-phase installations (normally time clock controlled) are also being widely

(Continued on page 118)

were utilized to our first 110 kv/13

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for satisfaction

...and sales

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Satisfaction for your customers... *sales for YOU!* Here's why:

ALL BRONZE—won't rust or corrode. Safe grounds on copper tubing or galvanized pipe. *(Cadmium plated at no extra cost where code requires plating.)*

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WEAVER—THE ONLY COMPLETE BRONZE LINE for ¼" to 4" pipe—any type connection.

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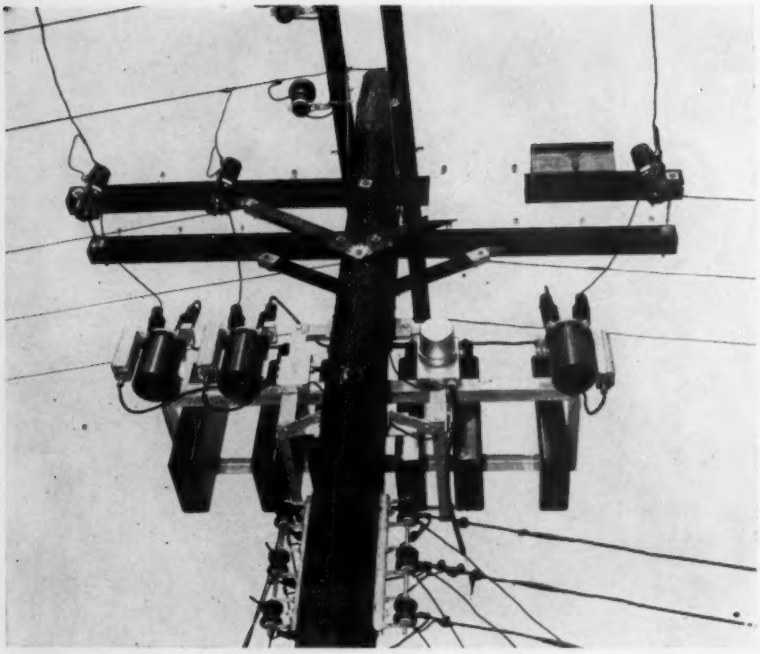


Baltimore Gas and Electric Company is now installing 300 kvar factory pre-assembled capacitor banks equipped for automatically controlled switching and capable of an ultiiate installation of 450 kvar.

110 kv circuits supply Baltimore master substations

By F. R. Evans

Distribution Engineer
Baltimore Gas & Electric Co.
Baltimore, Maryland

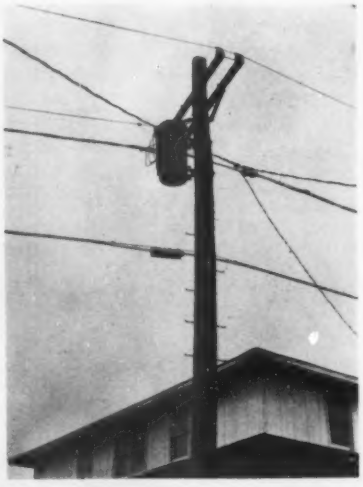
◆ BALTIMORE Gas and Electric Company's summer loads have been increasing at such a rate that it is expected in 1957 the system load will peak during the summer months for the first time. During the last five years winter loads have increased at a yearly rate of about 7 per cent whereas summer load growth during this period exceeded 9 per cent per year. Increased use of residential air conditioning and other cooling equipment is indicated by the rate of growth of summer loads on our distribution systems. Our 4 kv distribution system, which accounted for half of our 1957 summer system peak load of 895 megawatts, and includes light commercial as well as residential areas, has been experiencing a summer load growth of 10½ per cent per year. Winter loads in our residential areas are increasing at about the same rate as that for the entire system.

The bulk of our load is in the City of Baltimore and the surrounding suburban areas. A few years ago it became apparent that the large blocks of power required in this high load density area could not be supplied economically from our existing 13 kv or 33 kv sub-transmission system. Considerable study indicated the most desirable plan of supply would be the installation of large master substations located adjacent to the downtown area and supplied by 110 kv circuits with transformation to 13 kv or 33 kv for local subtransmission. Since congested conditions as well as city restrictions prevented the installation of 110 kv overhead circuits to these substations, underground, oil-filled, high-pressure, pipe type cables were utilized to our first 110 kv/13 kv master substation placed in service last summer.

The installation of shunt capacitors on our 4 kv distribution system is helping to provide for the increasing summer load growth. During the next 5 years we have preliminary plans for the installation of approximately ¾ kvar for each kw increment of load growth. Capacitors now installed are 300 kvar factory pre-assembled units equipped for automatically controlled switching and capable of an ultimate installation of 450 kvar. Control for automatic switching is accomplished by any of three different methods: (1) electronic impulse, (2) time clock or (3) voltage differential. Larger installations within urban and suburban areas are usually electronic impulse controlled.

It is our practice to install oversized wire in both the primary and secondary distribution circuits to allow for foreseeable load growth. This eliminates the early and uneconomical replacement of inadequately sized wire. Accordingly, our new open wire express distribution feeders are a minimum size of 3/0 ACSR, and may be as large as 350 MCM aluminum. All secondary buses supplying new residential areas are 3/0 ACSR. Triplex construction is utilized in both the bus and service loop affording a more economical installation as well as an improved appearance. To avoid premature replacement, new transformer in-

(Continued on page 116)



An example of triplex secondary construction now used on the Baltimore system.

New..Delta-Star Heavy Duty Aluminum Connectors!

Delta-Star announces a complete new line of connectors. Extra rugged construction and engineered for maximum service life under all conditions... Particularly important in this new line are the heavy walls and generous overall dimensions. With these features pressure is distributed to permit optimum contact yet with negligible cold flow...All sizes and ranges of conductors are cast on surface of each connector...Can be supplied in types and sizes to meet all connector requirements. For further information, write Delta-Star Electric Division, H. K. Porter Company, Inc.—2437 West Fulton Street, Chicago 12, Illinois.

District Offices in Principal Cities

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DELTA-STAR ELECTRIC DIVISION

Porter Divisions: Cleveland, Connors Steel, Delta-Star Electric, Henry Disston, Leschen Wire Rope, Quaker Rubber, Refractories, Riverside-Alloy Metal, Vulcan Crucible Steel, W-S Fittings, H. K. Porter Company (Canada) Ltd.

CP&L handles load growth

By W. F. Harper
Division Engineer
Carolina Power & Light Co.
Southern Pines, North Carolina

◆ CAROLINA Power & Light Company's annual peak demand has grown from 425 mw in 1948 to 902 mw in 1956. The growth has been fairly steady, averaging about 10 per cent increase each year. The annual system peak occurs in the winter, usually in December; however, there is currently a trend toward a summer peak. The kwh consumption has grown steadily at 9 per cent to 11 per cent each year.

To provide adequate service to the customer, the distribution system has had its share of study and alteration. From the substation section, there is available the load data on all substations. The line engineering section makes periodic checks on the primary feeders. Individual substations or feeders do not follow the steady growth mentioned above. Some feeders grow at the rate of 5 per cent to 6 per cent a year, while others grow at a rate of 15 per cent to 20 per cent. Actual voltage conditions are recorded on each main feeder.

From these data are calculated the present losses and voltage drop; then by projecting the load to various values, such as 150 per cent and 200 per cent of the present load, the losses and voltage drop at some future load are found. This indicates the eventual behavior of the feeder at these future loads. Calculations will show at what predetermined loads something has to be done to correct the voltage. By applying an energy and demand cost, the losses are evaluated in dollars. This is necessary to determine how much can be spent on plant additions to reduce the losses. Transmission lines, substations, and distribution systems are all considered by a planning committee to determine the most economical and feasible way to attain the overall objectives.

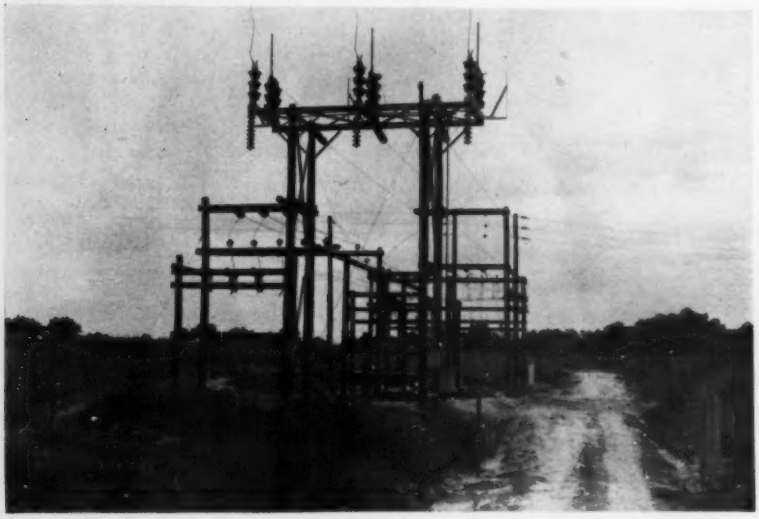
Long run savings

Some of these studies have shown that it is not always the plan with the lowest first cost that is the cheapest in the long run. Some plans do not save money until perhaps five years.

Studies of this kind were made several years ago in Sanford, N. C. and Asheboro, N. C. If conditions change, such as the addition of a 2500 kw new industry in Sanford which is five miles from the present substation, then the calculations are revised and appraised.

In Sanford calculations showed that the economical and practicable solution was to build 4 miles of 110 kv line and install a 110/23 substation on the opposite side of town from the existing 110/12 kv substation. It is interesting to note the higher distribution voltage which Carolina Power & Light Company uses whenever it is advantageous.

Going into service this month is a 110/23 kv substation located on the east side of Sanford in an area that is expected to grow. A bypass on a federal highway running North and South is under construction on the far side, adjacent to the substation. Two 23 kv feeders, one north and one south, are located along the edge of this proposed bypass. This area is expected to grow rapidly in residential, commercial, and industrial busi-



This 110/23 kv substation (shown before installation of transformers) is located in Sanford, N. C. Constructed with creosoted pine poles and aluminum buses the structure will go into service this month.

Asheboro curb and gutter conflict meant relocation of poles. Site is now future route of feeders.

on long term basis

ness, after the road is completed. Long-range plans are to convert portions of the 12 kv system to 23 kv to eliminate the possibility of overloading the present substation. As necessary, additional conversions will be made until the 12 kv and 23 kv capacity have been exhausted.

Second 12 kv source

In Asheboro, the study revealed that when the present 12 kv source becomes overloaded, it will be more economical and feasible to establish a second 12 kv source. The substation site has been purchased and routes for two 12 kv feeders have been established. A recent curb and gutter conflict on Uwharrie Street meant moving the poles to new locations. However, the middle #4 copper wire was replaced with 1 - 336.4 mcm ACSR 18/1 conductor. This will be the route of our feeders which we will build in about two years.

Primary conductors recently have been changed from #2 copper and #4 copper to 336.4 mcm ACSR 18/1. The economy of this was justified by the savings in kw losses through use of larger wire.

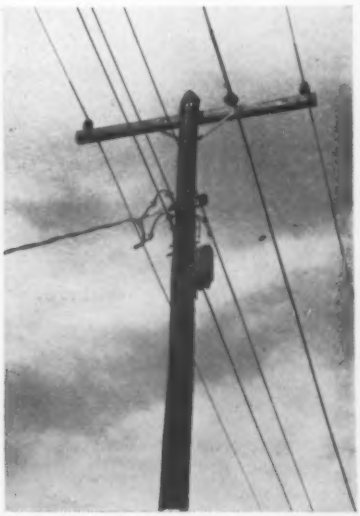
Customers are served from the 23 kv lines with one transformation. The plant located in Robbins, N. C. converted the primary from 2.4 kv to 23 kv a few years ago. This conversion was necessary to maintain proper voltage levels and to eliminate excessive losses.

Primary and secondary capacitors are used throughout the system for power factor correction and voltage control. Some primary capacitor installations are switched by voltage control to regulate the primary voltage. Some are permanently connected to the primary and maintain a constant boost. Secondary capacitors are permanently connected at the end of secondary runs on single-phase transformers.

Increased loads on our distribution system were dealt with by planning ahead and, among other things, installing capacitors and large conductors. The secret to economical expansion of distribution systems is planning ahead and taking corrective action before trouble develops. Once a line is in serious voltage trouble, time does not permit the making of a proper analysis.

This Robbins, N.C., plant service was converted from 2.4 kv to 23 kv to maintain proper voltage levels.

Primary conductors have been changed from #2 and #4 copper to 336.4 mcm ASCR 18/1. Savings resulted through the use of larger wire in this area located on Greensboro Rd., out of Asheboro, N. C.



Secondary capacitors are permanently connected at end of secondary runs on single-phase transformers.

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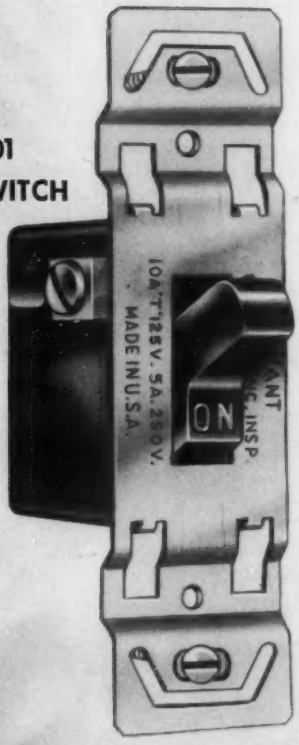

For economy plus Bryant dependability try this switch on your next job. It fills the bill for most residential installations.

COMPACT — plenty of wiring room
STRONG — built to last a house-time
HANDY — captive mounting screws make installation easy
SAFE — fully enclosed operating parts
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Available now at your Bryant Distributor.

No. 5242, 5262 grounding duplex outlets. Bryant's exclusive design solves breakage problem on grounding terminals. Made of sturdy plastic in brown or ivory. NEMA and ASA Standards.

. . . the new "T"-rated switch from BRYANT

SUPERIOR WIRING DEVICES

Bryant introduces the newest addition to its complete line of moderately priced wiring devices. It's the new Bryant No. 6001 wall switch. Available with brown or ivory handles . . . single pole or 3-way.

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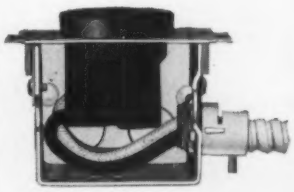
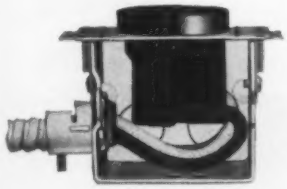
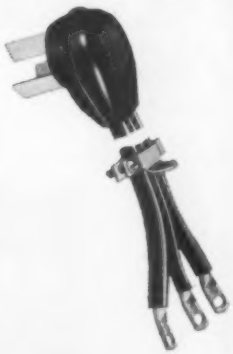
No. 6142 duplex outlet. Floating double-sided contacts grip both sides of cap blades. Spring grip terminals make hook-up easy. Rated 15 amps, 125 v. Made of sturdy plastic in brown or ivory.



No. 9303 three-wire polarized connector. Clamp-type pressure terminals make fast, sure contact. For dryers, built-in range, commercial cooking. NEMA and ASA Standards, rated 30 amps, 250 v.



No. 9306 heavy-duty three-wire flush-mounted polarized connector. Pressure-type, recessed terminals give fast, sure contact. Accommodates No. 6 wire, mounts in single gang box. Rated 50 amps, 250 v.



No. 3830 three-wire polarized cord sets. Rated 50 amps, 250 v. Flat, molded cord with two No. 6 and one No. 8 wire. Non-removable molded plastic cap. Ideal for major appliances. Perfect match for No. 9306 connector.

THE BRYANT ELECTRIC COMPANY

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General Contractor: Manhattan Construction Co., Muskogee, Okla.
Electrical Contractor: Western Division of J. Livingston Co., St. Louis, Mo.
Conduit Supplier: Westinghouse Electric Supply Co., Tulsa, Okla.

Fifth and Boston Corporation's strikingly beautiful First National Building at Tulsa, Oklahoma, utilizes quality-controlled Youngstown "Buckeye" Black Enameled Full Weight Rigid Steel Conduit exclusively, for protection of its all-important electrical wiring system.

Nationally-known building owners, leading contractors and progressive architects realize that electrical systems that don't function safely and efficiently are definitely a bad investment. So to guard against this costly condition they specify Youngstown "Buckeye" Conduit for its long, trouble-free service life.

"Buckeye" Conduit is easy to fabricate on the job—easy to fish wires through—and thoroughly corrosion-resistant to damaging elements such as water, moisture, vapor, dust and dirt.

Leading distributors in every industrial and electrical market are ready to serve you quickly from their ample stocks. They're as near as your phone—why not call today?

Standard-threaded rigid steel conduit is the only wiring system approved today by the National Electrical Code as moisture-, vapor-, dust- and explosion-proof for use in hazardous locations and occupancies.

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AVOID THESE COSTLY STEPS ON THE JOB BY USING RACO SET-UP BOXES!

1 Remove center KO in bottom

2 Loosen stud set-screw and separate bars

3 Remove stud assembly

4 Position stud assembly in center KO of box

5 Insert female bar section through saddle and assemble both sections of bar

6 Tighten stud set-screw

It costs you 12¢ at average labor rates, to have your men assemble a box on a bar. You can buy the same box and bar factory assembled for an assembly charge of about 2¢. You save 10¢ on every set-up box you install . . . a substantial dollar savings to add to your profits.

YOU CAN'T ASSEMBLE FOR 2¢! TRY IT!

ALL-STEEL EQUIPMENT INC.
Aurora, Illinois

Knoxville distribution modernization meets 13½ per cent yearly load increase

By Howard Dycus
Overhead Engineer
Knoxville Utilities Board
Knoxville, Tennessee

◆ KNOXVILLE system peak loads, since 1933, have grown at an almost constant rate of 13.5 per cent per year. From a demand of some 17,000 kilowatts at the depth of the depression, the demand increased to 321,000 kw in the winter of 1956-57. Should this rate of growth continue, the system demand will reach more than 1,000,000 kilowatts by 1966.

During the last sixteen years, the Knoxville area has experienced a large increase in population, due at least in part to the proximity of the AEC installation at Oak Ridge. In turn, the average energy use per residential customer has climbed from 1500 per year in 1940 to 8979 per year at the end of 1956, due to increased use of electricity for house heating. Thus, the system load has been greatly influenced by residential usage. It is interesting to note that while total annual commercial and industrial energy use has increased 3.7 times (from 157,000,000 kwh to 577,000,000 kwh) within this sixteen year period, the residential usage has increased from 46,000,000 to 578,000,000 or by more than twelve times.

As might be expected on a system so largely influenced by residential heating loads, the system load curves show deep summer valleys and sharp winter peaks. Air conditioning, although on the increase, has as yet had no pronounced effect on the summer load, and the ratio of winter to summer peak is about two to one.

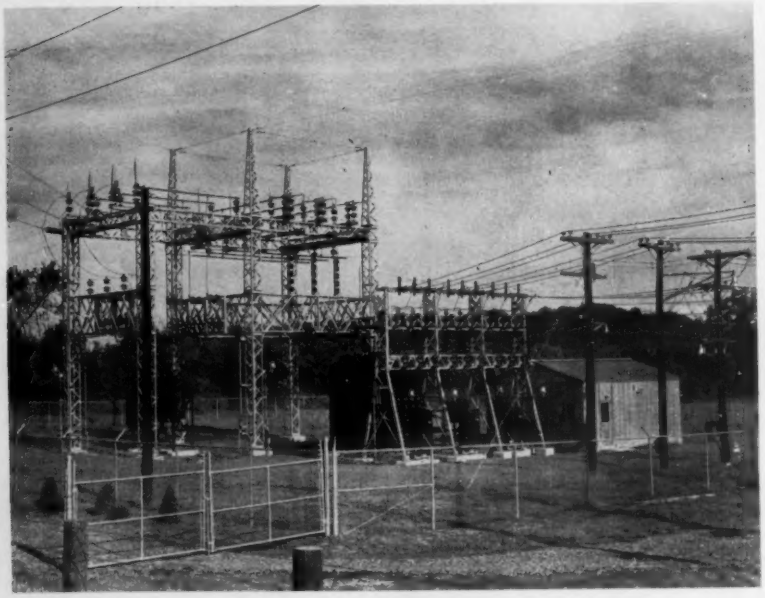
In 1946 the Knoxville system had two supply points and a demand of some 78,000 kw. A load study started at about that time indicated the tremendous growth which might be expected. In anticipation of this, it was decided to establish at 66,000 volt subtransmission system. This was done, with the initial system having three 66,00-13,800 volt substations supplied from two receiving stations.

Supply points increased

The system has been expanded until it now includes twenty 66 kv stations with an installed capacity of 253,000 kva and more than 100 miles of 66,000 volt lines. As required by load growth, these lines are being taken into the outlying parts of the 1,000 square mile area served and are being formed into loops. Substations in the rural areas generally have one or two 5,000 kva transformers. Those in the urban and densely populated suburban areas have one or more 10,000 or 12,000 kva units. It is anticipated that as the load grows, additional stations will be interspersed on the line loops between the existing stations. In fact, 7 such stations, requiring construction of more than 20 miles of 66,000 volt line, are either under way or planned.

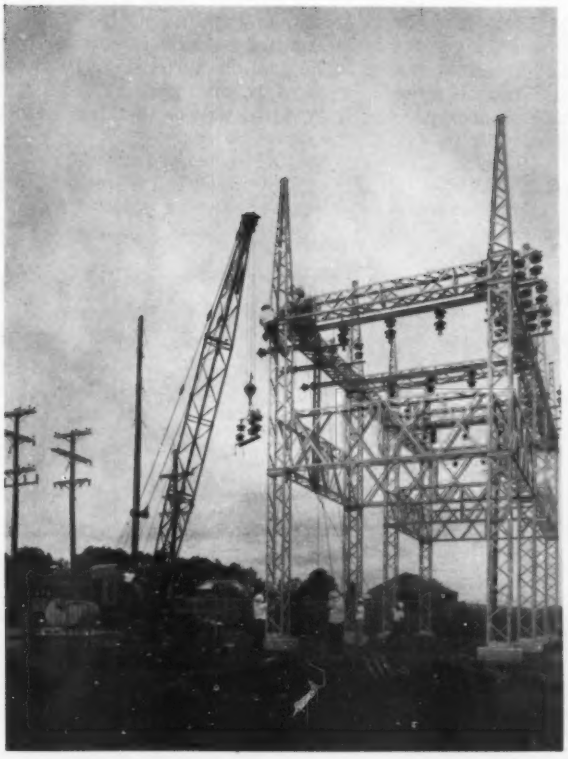
To provide greater flexibility and continuity of service, we are also constructing 13,800 volt ties between these stations. These distribution ties are generally of #2/0 or 250 mcm copper, although some all-aluminum and ACSR have been used.

Within the Knoxville city limits and in limited areas immediately adjacent to them, some 75,000 kva demand is supplied from 13.8 — 2.4/4 kv substations. The rate of growth of this portion of the system is about 6 per cent per year as compared to the over-all rate of 13.5 per cent. With the load densities being encountered, it is felt that it would not be economical to expand this system. The fringe areas of the 2.4/4 kv distribution are therefore being converted into an ever smaller area. As can be seen, this requires conversion of some 4,000 to 5,000 kva

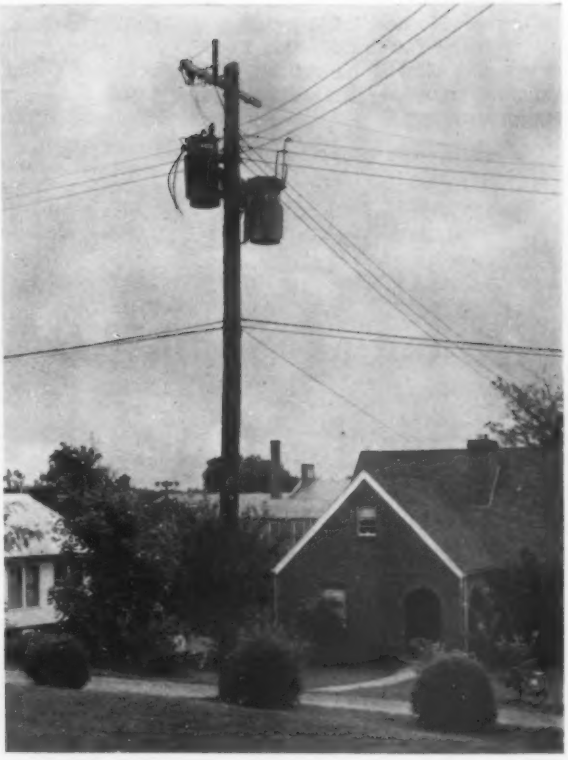


This 12,000 kva substation is typical of the twenty substations now serving the Knoxville area with an installed capacity of 253,000 kva.

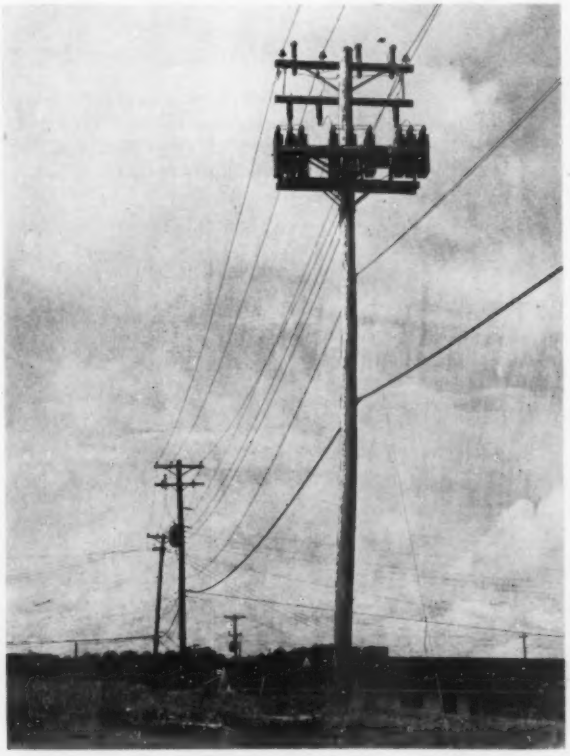
each year. No new 2.4/4 kv capac- stalled a total of 40,000 kva of combined capacity of 426,800 kva.



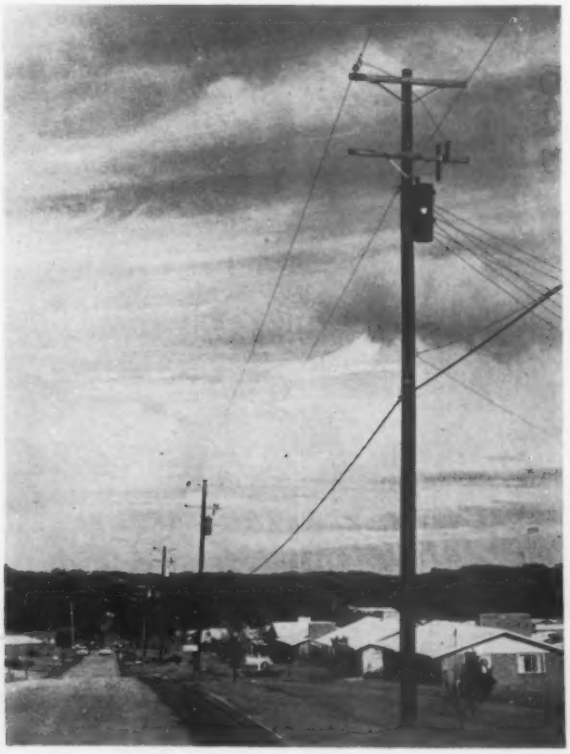
A mobile crane is being used in the construction of a 66-13.8 kv substation which will relieve adjacent



stations. In an area being converted, at right, a 7,980 volt transformer replaces a 2,400 volt unit.



Capacitors are generally pole mounted in banks of 150 to 450 kva (above). At right, electric heating



still has primary influence on residential loads, sometimes requiring a transformer for every pole.

each year. No new 2.4/4 kv capacity is being purchased, and as it wears out it will be retired and supplanted by the higher voltage equipment.

More capacitors used

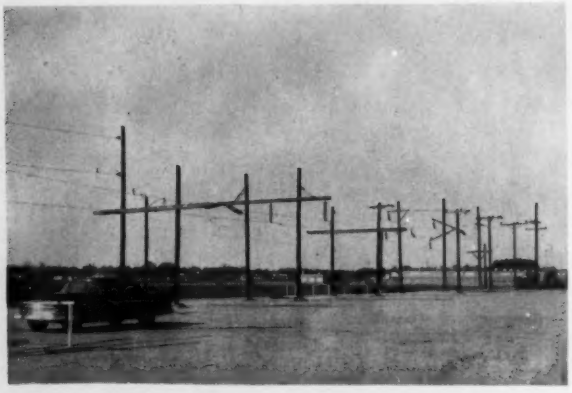
Up to 1951 only a very few capacitors had been used on the system. Since that time we have installed a total of 40,000 kva of which 17,500 kva are on the 2.4/4 kv system and 22,500 kva on the 7.9/13.8 kv system. For the most part these capacitors are pole mounted in banks of 150 to 450 kva. An additional 10,000 kva of capacitors is planned for 1959.

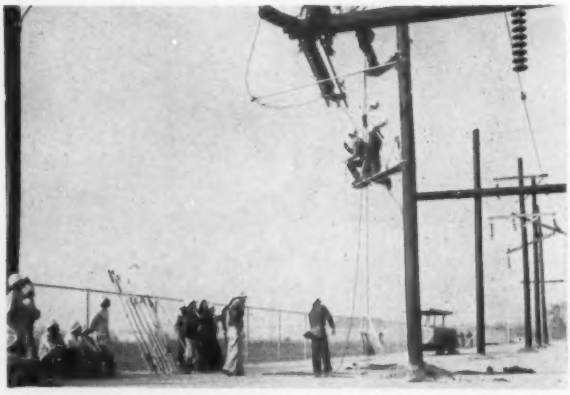
The Knoxville system presently has two receiving stations with a combined capacity of 426,800 kva. Preliminary studies are under way to determine the best location for a third receiving point, which it it expected will be installed within the next five years.

Several forms of load testing are being employed to insure that load increases can be recognized in

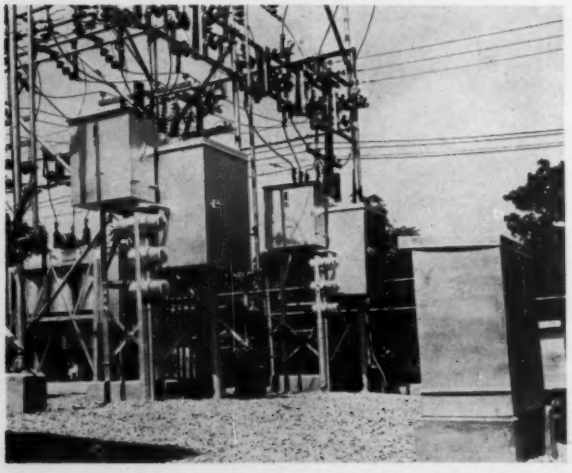
(Continued on page 74)

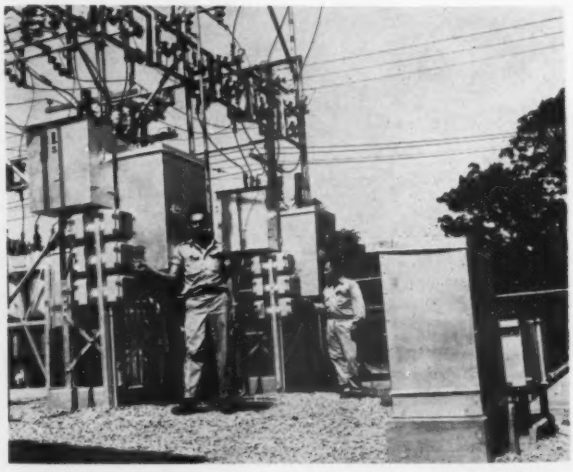
Distribution Service Center provides facilities for testing and training





The Southwestern Gas and Electric Co., with headquarters in Shreveport, La., has been since 1946 experiencing an average load growth of 13.6 per cent per year. With hot summers the increase has been as much as 21 per cent; with cool summers as low as eight per cent. The Service Center provides adequate facilities for testing new devices and training employees, thus reducing distribution costs.

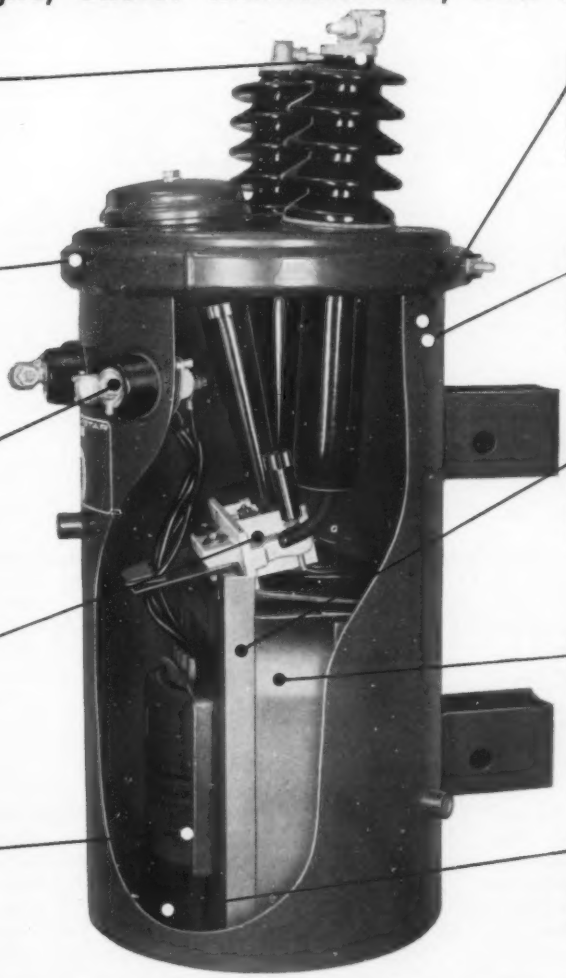




To keep up with load growth, the 2.4 and 4 kv distribution has been cut-over to 12 kv and capacitors have been installed up to 70 per cent of peak demand. With this procedure a low voltage complaint usually means an over-loaded transformer. To continually monitor circuit conditions most heavy feeders are equipped with socket mounted single phase indicating instruments. The socket mounting permits the substitution of recording instruments without the use of skilled electricians. One set of recording meters are provided for a group of six or more stations.—L. T. Williams, chief electrical engineer.

HERE'S HOW DELTA-STAR DISTRIBUTION TRANSFORMERS*

offer lighter weight, easier maintenance, and improved core



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Double-keyed—connector to porcelain—porcelain to tank. Assures positive lock against rotation.

COVER

Assures positive seal—and natural shedding of water. One-piece non-corrosive clamping band with re-usable nitrile rubber gasket.

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Tin-plated bronze alloy. Spring loaded to accommodate aluminum or copper conductors.

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Wound with liberal insulation. Heavy Formvar wire. Ducts provide maximum, uniform cooling.

TANK

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Will not shift under severest handling conditions. Securely anchored to tank wall. Positively braced against short circuits.

PORTER CORE

Grain-oriented, cold-rolled silicon steel. Assures low losses, smaller tank, minimum weight.

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Gives extended life with better insulating characteristics. Specially processed immediately before filling.

With single phase ratings from 3kva to 167kva, in standard voltages through 15,000 volts, this complete line of Delta-Star Transformers embodies the latest developments in transformer design . . . a pole type built to fully meet NEMA standards.

Send for 16-page illustrated catalog. **Write to H. K. Porter Company, Inc., Delta-Star Electric Division, 17th and Cambria Streets, Philadelphia 32, Pa.**

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Distribution primaries upped to 12,470 volt wye operation

By E. J. O'Connor
Distribution System Engineer
Florida Power Corporation
St. Petersburg, Florida

◆ LIKE ALL UTILITIES engulfed by the snowballing growth era in the south, Florida Power Corporation is experiencing tremendous growing pains. From 1941 through 1956, our system demand has grown at an average annual rate of 12.8%. The average annual kwh usage of our residential customers for the same period has increased at an average annual rate of 6.5% along with an increase of 7.7% in average annual commercial kwh usage.

With this growth has come the complementary problems of maintaining adequate capacity and service to present consumers as well as providing spare capacity for future growth while still holding expenditures in line with revenue. To cope with these problems distribution wise, management has had to make many major decisions.

Of prime importance has been the decision of management to pursue a program of completely converting the distribution system of this company to 12,470 volts wye operation. This program was started in 1946, and will be approximately 80% completed by the end of this year. Prior to this time, the company had been shackled with a varied assortment of voltages through the acquisition of various properties, characteristic of the growth history of the company. Load forecasts at this time which have now proved to be conservative showed that management had to decide to continue with its assortment of voltages posing the problem of non-standardization of construction and materials, and limited area coverage plus the need of additional substation sites on a rising land market with zoning problems or convert the system to an economical voltage more suited to the characteristics of the system, even though first and operating costs were known to be higher. Evaluation of the intangible factors of standardization and improved area coverage reconciled the decision to convert to the higher voltage.

During this period of conversion, all new construction and maintenance work has been insulated for 12 kv operation. This has minimized the amount of work necessary at the period of conversion.

Once an area has been converted to this higher voltage, it is still necessary to continually observe the load growth in the area. In the more critical service areas, the company has made detailed load studies to predict future loads in one year increments for five year periods. This has been done by determining the load densities per mile in the service area through connected transformer kva per mile, and converting kva per mile to kw per mile by the ratio of the substation demand to the total connected transformer kva in the area. These demands per mile are projected yearly based on past growth and known future developement of the area. This type of study has allowed us to establish a flexible grid system of an area whereby we can establish new substations in the area as it reaches its coverage capacity. Yearly comparison of the actual growth to the predicted growth of the service area has permitted us to expedite or defer the reinforcement of this service area.

Adequate feeders

Expansion and reinforcement of the service areas has presented further problems. Some of our service areas have reached load densities of 15,000 kva/mile while still others have stayed below 2500 kva per mile. Here again poses the problem of providing adequate feeders in the service area with capacity for growth without exceeding the limits of economical expenditures. As a guide in establishing feeders in new service areas and overloaded areas we have applied Kelvins Law in making studies of economical wire size and transformer size. From this we have been able to standardize wire in the following sizes: #6 and #2 solid copper, #4/0 stranded copper, #4 ACSR, #1/0 ACSR and 336.4 MCM AAC. Standard transformer sizes are 5 kva, 15 kva, 25 kva, 50 kva, 100 kva and 167 kva. Change out of conductor is based on assigned amperes for 20° C rise. Change out of transformers is based on 200% loading for more than 30 minutes.

Analysis has shown that rural, residential and light commercial areas with varying densities to 10,000 kva per mile can be served adequately from overhead lines. Densities above this are more adequately served underground. Establishment of spot networks in shopping centers has proved to be very satisfactory to meet certain conditions. We are now supplying 277/480 volts to a few customers and feel that with more experience it will prove to have beneficial applications.

Service continuity

Service continuity has been another problem to be overcome. In the more important service areas where in the past back up feeders from another area were necessary to insure minimum outage due to transmission or substation bank failures, we are installing the doubled ended type of substation using OA/FA/FA transformers. This will prove to be more reliable and economical than having capital invested in spare overhead capacity. Present back up feeders will be changed to radial type feeders. The company is striving to minimize outages and burn down by the use of modern relaying. All main feeders are sectionalized with disconnects or load break type switches with two sources of supply wherever possible to isolate faulted sections. All branch lines and transformer stations in urban areas are fused. Increased use of reclosers in rural areas has greatly minimized outages. A program of the combined use of reclosers, sectionalizers and self protected transformers in specified rural areas shows promise of an improved means to better service continuity.

Present forecasts show a continued increase in customer usage and demand. Past experience has shown us the only avenue of success in serving the customer is continued vigilance of the service area and the application of sound economic and engineering principles in maintaining the service area.

DEPENDABLE OUTDOOR LIGHTING CONTROL

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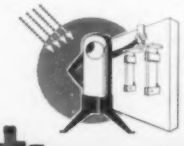
Throughout the United States, Fisher-Pierce units have provided more hours of dependable street light control than any other make of photoelectric control. For more than twelve years Fisher-Pierce has set the pace in the development and manufacture of photoelectric controls for all types of outdoor lighting.

Today Fisher-Pierce, backed by an organization of 600 people, offers unlimited facilities for the development of new controls and allied products for the electric utility industry . . . as well as the extensive service organization that stands behind each F-P control. Whether your requirements call for proven lighting controls for any type of outdoor lighting, development of new electric or electronic products, or engineering service in the installation and maintenance of lighting control systems . . . call on Fisher-Pierce.



THE FISHER-PIERCE CO.
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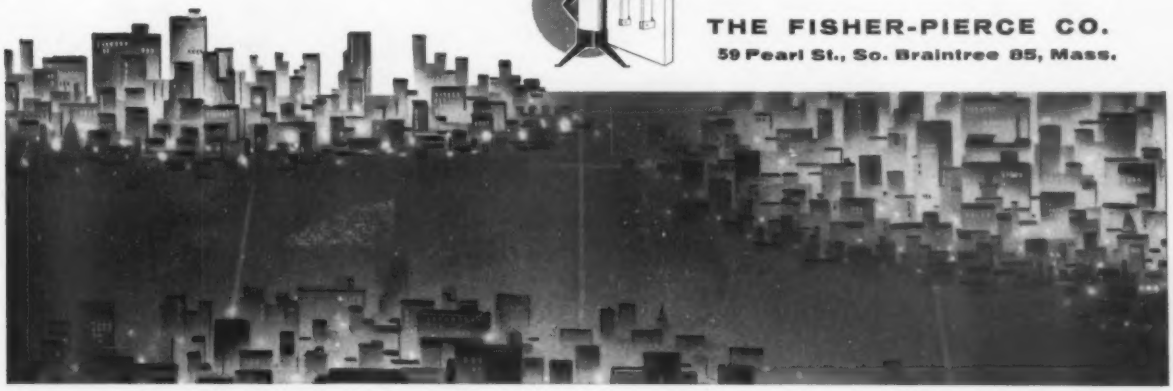

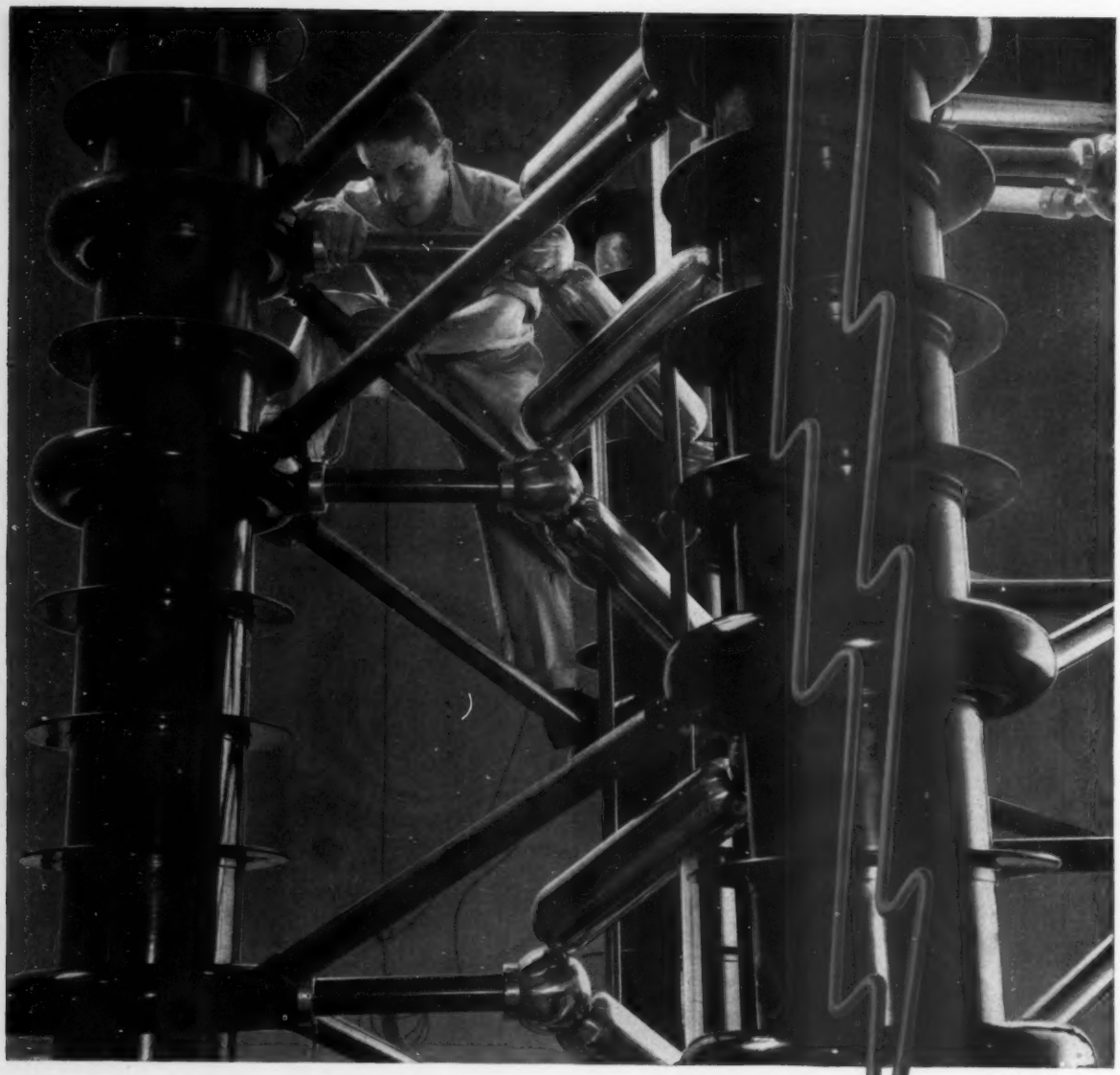

Simplex Wire & Cable Company's new 1,400,000 volt impulse generator — the first of its kind to be installed in North America — represents just one aspect of research at Simplex. Simplex scientists and engineers originated the process of vulcanizing portable rubber cords and cables in a lead mold. Simplex developed the first heavy-duty portable electrical cable — Simplex TIREX. The first truly moisture-resistant rubber insulation was the outcome of a commercially acceptable method of deproteinization developed by Simplex. Simplex designed the first interlocked armored cable for underground service — Simplex CONDEX. And now — Simplex C-L-X — the portable, corrugated metallic duct WITH SEALED-IN CABLE. **SIMPLEX WIRE & CABLE CO.,** Cambridge, Massachusetts and Newington, New Hampshire.

LIVE BETTER ELECTRICALLY

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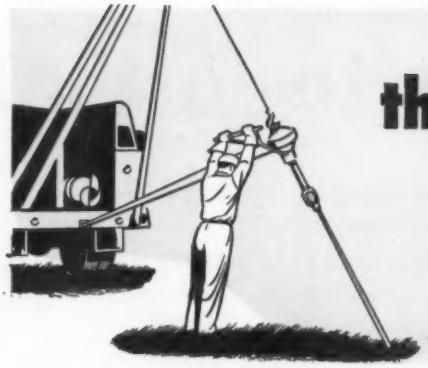
Highest quality cables for: Mining • Power & Lighting • Construction • Transportation • Communications • Signalling



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CAN BE INSTALLED BY MACHINE TO CUT LINE CONSTRUCTION COSTS . . .

Give the Guy a CHANCE

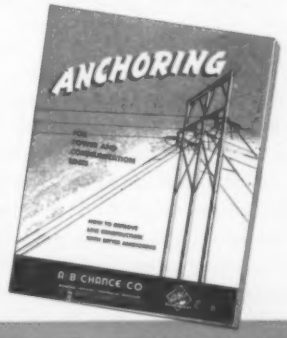
Power companies trying to trim costs can profit by the experience of a Florida Utility where the use of the big Chance 15 inch Screw Anchor was combined with machine installation to reduce anchoring costs.

The use of the fifteen inch Blackfoot permitted one anchor to take the place of several smaller ones. This added up to a considerable saving in material costs. Speedy machine installation—with fewer anchors to install—slashed installation time to a small fraction of what was previously required.

How did these anchors hold?

Company personnel conducted their own pull tests to determine the holding power of these Chance Anchors. The dynamometer showed *no* creep at 22,000 pounds!

You can protect your investment in line construction by specifying Chance Anchors for your guys. They really hold the load!



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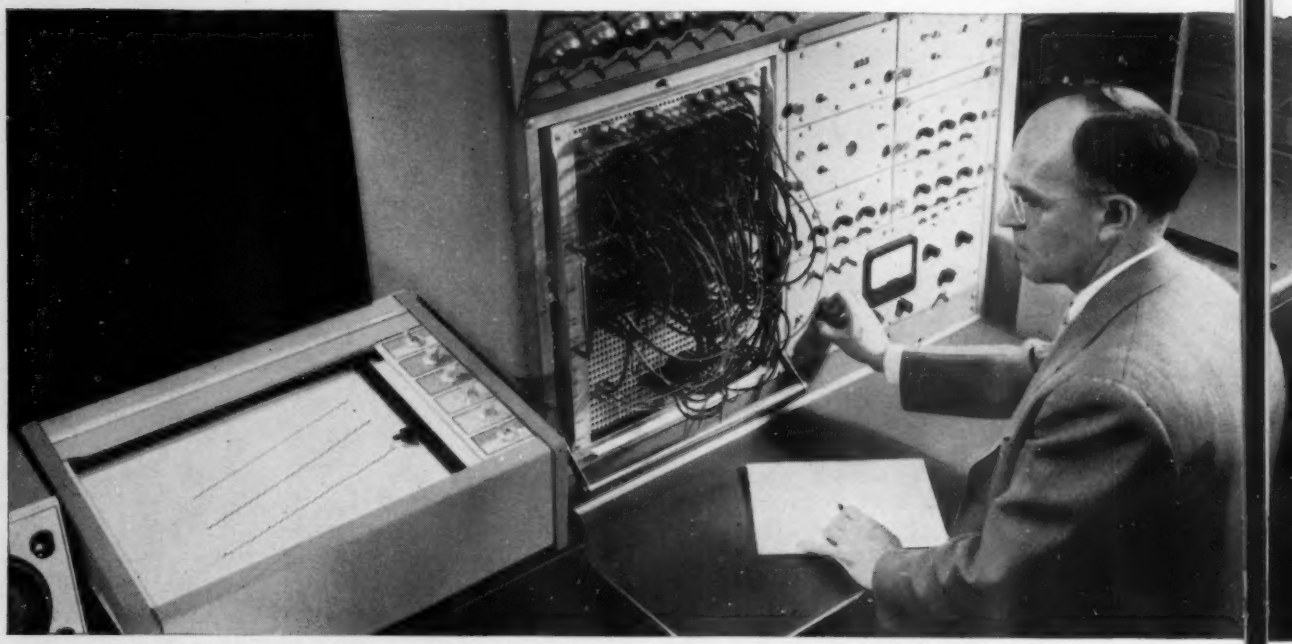
***PROVED:* WESTINGHOUSE *URL* AND *URF* REGULATORS**

Limit voltage error to 1/3 that

PROBLEM: Determine the combination of regulator components that will provide best regulation with greatest reliability, least maintenance

APPROACH: Analog computer to simulate operation of various controls and tap changers, and to evaluate the performance under conditions found on utility systems

ANSWER: Combination of 1¼% steps, inverse time delay, instant-response tap changer



H. L. Prescott, Development Engineer, Westinghouse Transformer Division, obtains regulator performance data with the analog computer. Conditions of an actual distribution system are reproduced—voltages of various characteristics are generated and applied to simulated regulators.

Extensive studies at Westinghouse with the analog computer have proved this fact of outstanding importance to every electric utility . . . the Westinghouse system of 1¼% step voltage regulation holds set voltage with ½-⅓ the voltage error of any other regulator! Tests compared two major systems (table, right) of step regulator operation, with a ± 1-volt setting, under the three basic supply voltage conditions—smooth changes, large and rapid changes, irregular changes. Results proved that the ability of a regulator to hold a set value is dependent on the kind of voltage sensing device, time delay control and tap changer. Results proved—and without exception—that Westinghouse 1¼% step regulation holds narrowest effective bandwidths, regardless of individual system characteristics.

To the utility, Westinghouse regulation means greater revenue for these reasons:

1. From feeder to customer—fewer operations, fewer regulators, minimum total regulation equipment expense.
2. Satisfactory voltages can be furnished farther out on the line without reregulation.
3. Heavier loading of existing lines is practical.

COMPARE:

A—Westinghouse regulators with 1¼% steps, inverse time delay, instant-response tap changer

B—Other regulators with ⅝% steps, fixed time delay, 7-second tap changer operation

Regulator	Set Time Delay	Maximum Voltage Error	Voltage Error Average
A	minimum	1.15	.20
B	15 second	1.22	.62
A	average	1.21	.25
B	30 second	1.28	.65
A	maximum	1.23	.29
B	60 second	1.34	.63

# of other regulators

G. K. Anderson, Voltage Regulator Sales, points to URL regulator whose superiority has been proved in service through thousands of installations for over ten years.

WESTINGHOUSE URL AND URF DISTRIBUTION VOLTAGE REGULATORS MEAN 42% FEWER OPERATIONS, 15% LESS CONTACT EROSION, FAR LESS MAINTENANCE

Providing these and many other advantages, the following features give you, altogether, the most practical regulators you can buy.

- Instant-response tap changer operates 15 times faster than other tap changers.
- Direct-drive Geneva gear mechanism provides optimum contact speed—eliminates flashover, minimizes contact burning, reduces erosion and carbonization.
- Load range selector—allows higher currents at reduced range operation; you get increased capacity to 160% of rated current at ± 5% regulation up to 400 amps.
- Coastal finish and single-bolt tank construction with no external hardware—maximum protection against corrosion.
- Separate tap changer oil compartment keeps metal and carbon from tap changer out of core and coil—eliminates core and coil maintenance.
- Unique new CVR relay, with integral, adjustable, inverse time delay in drawout Flexitest* case.
- Unit assembly of core, coil and tap changer.
- Draw stud bushings with single-bolt cover simplifies untanking (though rarely necessary).

*Trade-Mark

NEW URF STEP VOLTAGE REGULATOR, DEVELOPED AS A RESULT OF THESE EXTENSIVE STUDIES, HAS THESE ADDITIONAL FEATURES:

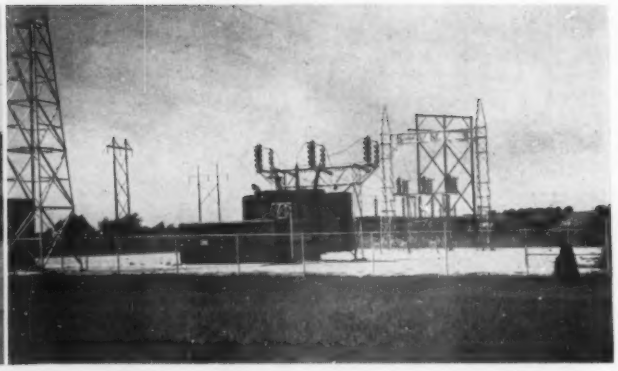
1. Higher current ratings—extends range of 1¼% step regulator.
2. Built for feeder application—reduces your initial investment for regulators up to 167 kva.
3. Provisions for hand operation.
4. Bridging-type contacts with magnetic yoke eliminate pitting under short circuit, provide maximum mechanical strength.

J-70819

YOU CAN BE SURE...IF IT'S Westinghouse

ELECTRICAL ENCLOSURES STEEL or ALUMINUM

A large 161 to 13.2 kv substation that contains four 25,000 kva transformers and feeds 13.2 kv distribution circuits in the south part of urban Kansas City.



A small 161 to 12.5 kv substation that has one 20,000 kva transformer and feeds into a fast growing suburban area. Space is provided for future transformers.

Capacitors, higher voltages solve load growth problems

By F. P. Gilpin
Principal Engineer
Kansas City Power and Light Co.
Kansas City, Mo.

◆ SOME EIGHT or ten years ago it became obvious to the Kansas City Power & Light Company's system planners that the residential air conditioning load would someday become a problem to be reckoned with, but it was not until the summer of 1954 that this type of load developed into the predominate factor for creating system peak loads.

Our 1954 troubles jolted us into action and launched us on an expansion program that enabled us to handle heat storms of succeeding years without too much difficulty. The system peak load increase was 18% between 1953 and 1954 and then dropped to 8% between 1954 and 1955. Between 1955 and 1956 the system load increase was only 6% but, between 1956 and 1957, it bounced up to 17%.

The load increase of 1957 over 1956 was somewhat more than was expected, but our expansion program had enabled us to build up enough of a cushion to take it without any serious overloads. However, it has been estimated that the system has only a 20% saturation of possible air conditioning installations and, therefore, the increase in system capacity to serve this type of load must continue.

The expansion program in Kansas City is being carried out along the following lines:

(1) To take care of load growth and supplement the old 4 kv distribution system, 7,620/13,200 volt distribution circuits are being extended into all sections of the city.

(2) Expansion of the 2,400/4,160 volt system has been halted. Load transfers from the 2.400/4.160 volt system to the 7,620/13,200 volt system have been carried out to keep the load on the 2,400/4,160 volt system within its ability to perform adequately.

(3) The spacing of distribution transformers has been decreased to shorten secondary runs and provide better assurance of satisfactory voltage for customer equipment.

(4) The 34.5 kv is being supplemented by 69 kv and 161 kv lines as sub-transmission for areas surrounding the city.

(5) Capacitors have been installed on all primary distribution circuits to improve circuit regulation and provide system var control. All recent installations are automatically switched with either time clock or thermostatic control.

It has been observed that load growth in the ever expanding suburban area surrounding Kansas City is much more rapid than within the urban area. This is a trend that every utility is probably encountering. On the Kansas City system, this load growth in the suburban areas was 22.5% between 1956 and 1957.

A rear property line in a new residential area where distribution transformers are closely spaced and secondary lines are short.

To provide adequate service for this area, it has been necessary to supplement the old 34.5 kv subtransmission system that encircles the city with a 69 kv system and, more recently, a program for extending the 161 kv system into these areas has been started.

The 161 kv lines were first built for interconnecting the Kansas City system with neighboring util-

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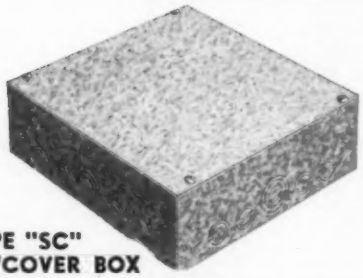

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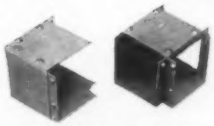

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ity systems and for transmitting large blocks of power into the urban areas. It has now become necessary to extend this system into some of the more rapidly growing suburban districts. The first 161 to 12.5 kv substation for the suburban area went into service in 1957. A second substation of this class is scheduled for 1958 and a third is scheduled for 1959.

Primary distribution of 7,200/-12,480 volts is being used in the suburban areas, while 7,620/13,200 volts are being used in the urban areas. It has been found, however, that standard 7620 volt transformers with two 2.5% taps above and below full winding will operate satisfactorily on either system.

These urban and suburban systems are in phase and there are emergency connections between the two which have been operated satisfactorily. There is at present a high percentage of old 7,200 volt distribution transformers on the suburban system which prevents raising that primary system to 7,620/13,200 volts, but is is planned that ultimately the higher voltage system will be in operation on the suburban system as well as in the urban areas.

Back in 1936, when extensive capacitor installations were first made, these installations were justified by the substation capacity released. Now, however, capacitor installations are more important for system var controls. The Kansas City system has several interconnections with neighboring utilities and the newer generating stations are more distant from load centers. Var control has become necessary to provide efficient power flow through these interconnections and through some parts of the sub-transmission system. When system additions, now under construction, have been completed, a power factor of 90% to 93% under normal operating conditions will be necessary to provide the necessary power flow.

Most capacitor installations are made on the 4, 12, and 13.2 kv distribution circuits where the individual circuits as well as the system are benefited. Pole mounted units, 600 kva, with automatic switching controls are the prevalent type of installation. Thermostatic and time clock controls can be adjusted to provide a satisfactory relation between vars and load. Some large capacitor banks with supervisory control have been installed at substations and it appears that additional installations of this type will become necessary as the system becomes more complex and var control becomes increasingly important.

Kentucky utility rebuilds with aluminum conductors

By R. H. McBeath
Chief Distribution Engineer
Kentucky Utilities Co.
Lexington, Ky.

◆ THE KENTUCKY Utilities Company System serves approximately 215,000 customers in 75 counties of Kentucky extending some 350 miles from the Virginia State line westward to the Mississippi River and from Tennessee northward to the Ohio River. Of these customers, 136,000 are residential, 48,000 are rural, 29,000 are commercial and 1,000 are industrial users.

In addition to distribution lines in some 500 towns and communities, the system includes nearly 7,000 miles of rural lines, 1,354 miles of 34.5 kv, 1260 miles of 69 kv, 197 miles of 138 kv and 102 milese of 154 kv, 39 transmission or sub-transmission stations with a total capacity of 1,450,000 kva and 407 distribution substations with a total capacity of 510,000 kva. System generating capability is around 500,000 kw with the largest plant of 150,000 kw at Green River.

System demand for 1957 is expected to reach 410,000 kw. Recent load growth has been normal except in certain areas of industrial development where large increases in load are requiring substantial reinforcement to both the distribution and sub-transmission systems. Already, work has started toward extending 138 kv into the Lexington area and converting more than 50 miles of 34.5 kv circuits to 69 kv. The outlying and industrial areas around Lexington will be supplied at 12,470 volts wye from this sub-transmission system. Two substations 10,000/12,500 kva capacity each (later 25,00 kva as required) are under construction and a 5000 kva station was recently completed. Existing substations in the down-town area of Lexington will be enlarged and maintained at present 4,160 volts wye operation.

Distribution voltages are predominately 4,160 wye or 12,470 wye. Because of many operating problems at higher voltages such as difficulty of maintenance tree conditions, series circuits, jointly-used construction, etc., most of the older systems of 4,160 volts will remain at this voltage. By necessity, the over-extended, lower voltage, rural lines are being made adequate by conversion to 7,200 volts grounded, and by addition of phases and/or enlargement of the conductor where required. This results in the salvaging of large numbers of small transformers. Many of these transformers are sent to the commercial repair shops for uprating in size and also in voltage where possible.

Most of the urban and suburban primaries and secondaries are reconstructed and enlarged using aluminum conductor. Polyethelyene cover is used in the secondaries which are #2 ACSR or #2/0 ACSR while the cover is usually omitted from primary and series conductor. #2/0 ACSR, #266.8 MCM 18/1 ACSR and 397.5 MCM 18/1 ACSR are the standard sizes selected for primaries.

Load density and the sizes of cities and towns served have not justified underground construction except to a small extent in Lexington and Paducah. Over-head 120/208 volt secondary systems are in use at three locations.

Few secondary capacitors are in use; however, 123.500 kvars of primary capacitors are installed on the entire system of which 68,900 kvars are fixed, 14,800 kvars are time controlled, 27,900 kvars are voltage controlled and 11,900 are manually controlled. 76,000 kvars of the total are installed on primary circuits and the remainder are on station buses.

All substations are equipped with 15 minute indicating demand-

(Continued on page 116)

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Bob Keough

(Look Magazine Award Winner)

uses Murray 100 amp equipment

On this job, the men rewired for 100 Ampere service using a king size SE100 meter box and a Main & Range with 12 circuits. This panel is so compact, they were able to use the old wall board installation — and saved plenty of time and labor.

BOB KEOUGH, Philadelphia contractor, who won Look Magazine's 1956 Adequate Wiring Award, became a home modernization expert through necessity. In his own words:

"Competition was getting so tough on new construction jobs, I found myself working for practically nothing.

"Then they started this home rewiring drive and I figured I'd concentrate on that. Now I'm getting plenty of business . . . and it's all profitable.

"Yes, on all 100 Amp jobs and over, I usually put in Murray. Why? Well, the men like it. Plenty of wiring room. The boxes go up fast without trouble. Good value. And there's a box for practically any wiring layout. What more can you ask for?"

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Murray

Knoxville load increase

showing individual distribution transformers have been available

offset by increasing mechanization. For example, it is estimated that

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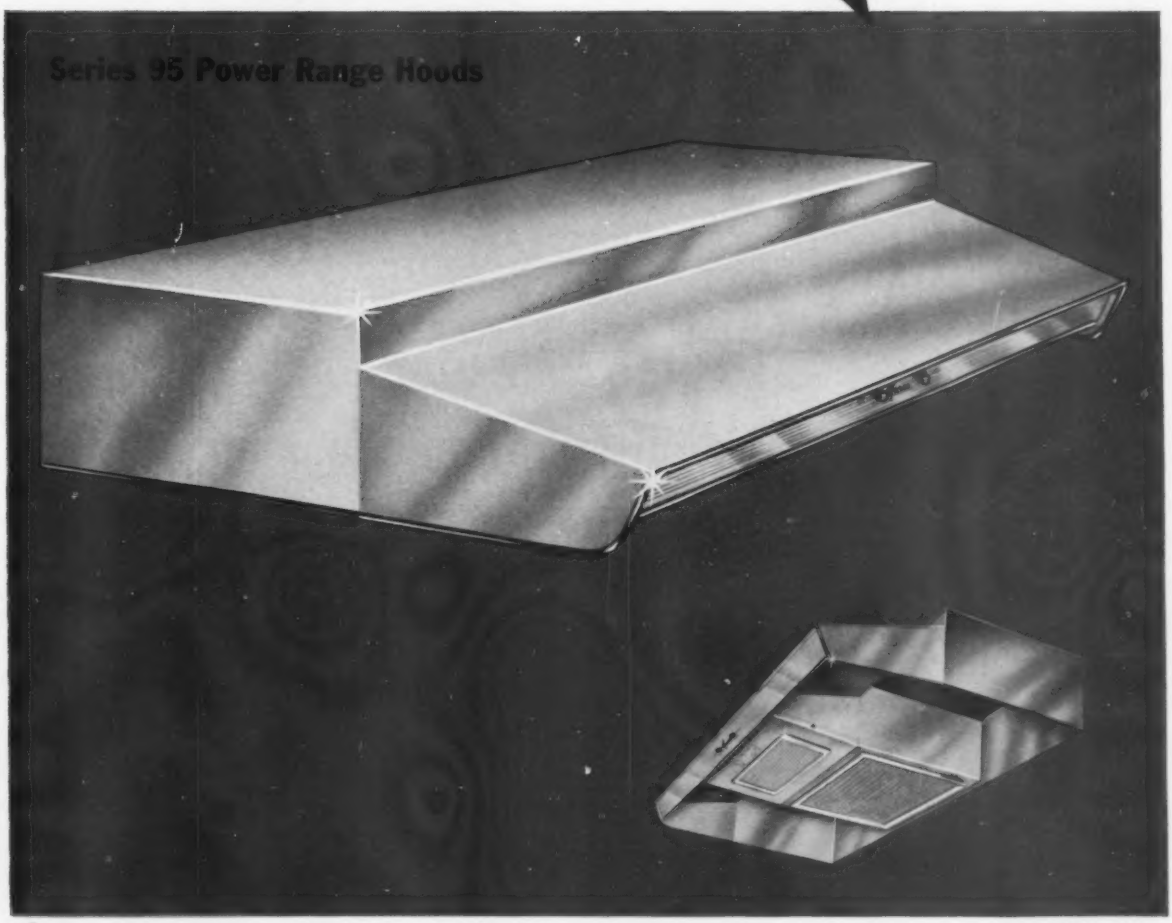

FASCO'S FIRST with the smart new look in power range hoods to fit today's trim modern trend in kitchens . . . crisp, sharp styling featuring a sparkling gold instrument panel gives this hood the wanted look of tomorrow.

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Knoxville load increase

(Continued from page 60)

ample time to permit steps to be taken to prevent damage to the system. Circuit loads at major substations are recorded hourly by means of telemetering and the data recorded on log sheets. At all other 13.8 kv stations and at the 4 kv stations each circuit is equipped with graphic thermal demand meters from which the charts are removed and peak readings taken at semi-monthly intervals.

Large portions of the rural system as well as parts of the urban and suburban system are supplied through some 300 pole mounted oil circuit reclosers which are in turn fed by the 7.9/13.8 kv distribution circuits. In addition to the fixed metering, spot readings with clamp-on type ammeters are taken at these recloser installations as near the time of the system peak as possible. These readings are converted to peak readings and recommendations for improvements based on results of the studies made from them.

Maps indicate load increase

While the fixed meter readings are valuable for over-all system studies, they leave much to be desired as far as the component circuit parts are concerned. Also, the "spot" readings are difficult to convert to peak readings since they must be taken over a period of several hours and several days.

Where studies are made long after the peaks are past, as is many times the case, it is often difficult to determine the exact status of sectionalizing at the time of the readings. For these reasons it is felt by some of our engineers that distribution studies can best be made from maps showing individual distribution transformers. From these maps connected loads can be determined merely by adding up the transformers. In turn the peak loads can then be accurately estimated.

For many years complete maps showing individual distribution transformers have been available for our entire 2.4/4 kv system and more recently for the urban and suburban portions of the 7.9/13.8 kv system. Annual studies made from them by the above method have indicated their value.

New mapping program

At the beginning of 1957 a mapping program was instituted to extend the detailed maps over the entire system. It is expected that these maps will be completed by midsummer of 1958. When completed they will permit study of the least circuit component without the estimating which was necessary with data heretofore available. It is anticipated that they will be used in continuous system, station and circuit studies.

Increasing material and labor costs are being at least partially offset by increasing mechanization. For example, it is estimated that with power saws, hydraulically operated "sky-workers", pneumatic pruning equipment and brush grinders, our tree clearing crews can now do twice as much work per man hour as was heretofore possible. Use of mobile cranes, power operated hole diggers and hydraulic truck derricks has similarly helped hold down construction costs.

Use of 10 kv arresters

At present we use 12 kv arresters on the distribution system. Use of less costly 10 kv arresters is being considered. It is proposed to install these initially on one circuit with the expectation that if justified by operating experience they will be made standard and use of the 12 kv arrester discontinued.

Understanding vectors

The series of articles on this subject by E. B. Henry, of Gulf Power Co., will be resumed in the December and following issues.

Digital computer applications aid distribution planning

By G. W. Bean
Chief Engineer
and B. M. Gallaher
Texas Electric Service Co.
Fort Worth, Texas

◆ COMPLEX PROBLEMS arising from rapid growth of the distribution system create a need for more complete and accurate analysis of the factors involved. Studies of the capabilities of the digital computer and its possible applications to these problems compel the conclusion that extensive use of this tool is inevitable. The utilmate in such beneficial applications will be limited only by the imagination of the distribution engineers involved.

One successful application of the accounting type computer has been in use by this company for some five years. This program calculates the load on individual distribution transformers from the customer kwh consumption during the annual peak month, by the use of factors derived from sample transformers equipped with load measuring devices.

Other applications of the accounting type computer and also of the "stored program" type digital computer are in various stages of development. Some of the applications involving distribution loads and feeders include calculations of line losses, voltage spreads, fault currents, load densities, load centers, and conductor overloads. Another is the monitoring and maintaining of load balance between phases.

Use of the digital computer in these applications will provide more up-to-date and accurate information and allow more judicious decisions involving conductor replacement and the location of new substations, feeders, capacitors and regulators. Considerable savings in engineering man-hours realized from such uses add substationally to the attractiveness.

Use of the "punched card" for conventional transformer and meter records result in simplification and mechanization of much of the record keeping chore. Work is being done on a scheme using the "punched card" for recording service interruptions. This will result in better correlated data and allow more conclusive analysis than is possible using manual methods.

Because of SPANG's high quality, Cahn Electric unconditionally guarantees the SPANG HD Conduit installation at the Childs Food Stores Building for one year, reports Mr. R. C. Jackson.

"SPANG® Conduit has the quality to do the top-flight job required of it"

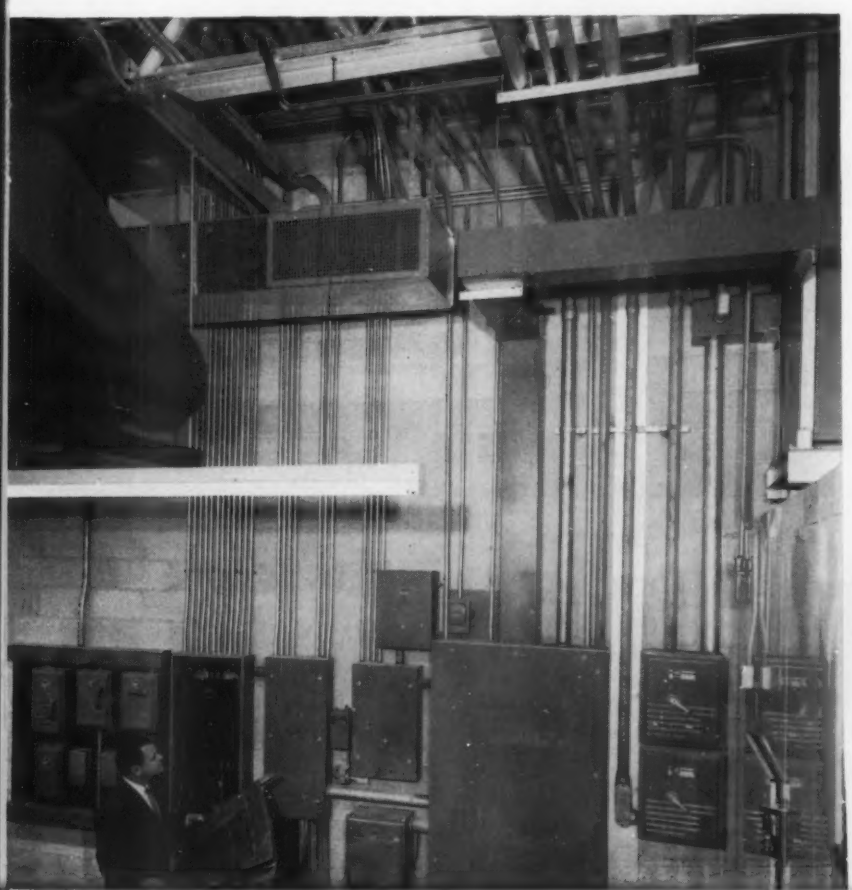
—says Mr. R. C. Jackson, Cahn Electric Company, Shreveport, Louisiana

72,000 ft of SPANG HD go into Childs Food Stores Building

The new Childs Food Stores Building in Shreveport, Louisiana, houses the division offices, garage, warehouse and a supermarket, and contains a total floor space of 263,000 sq ft. Electrical equipment, in addition to the regular and emergency lighting systems, includes air conditioning, refrigeration facilities, public address system, intercom system, burglar and fire alarms and a conveyor.

"The wiring throughout the building is protected by 72,000 ft of ¾" to 3½" SPANG HD Conduit," says Mr. Jackson. "We used SPANG for two reasons: first, because of our company policy which calls for maximum quality of all materials used; and second, because we know we can count on SPANG meeting its delivery schedules.

"The installation of SPANG HD was easy and presented no problems. We're so confident of its performance that we guarantee its installation unconditionally for a one-year period. We expect it to last a lifetime."



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You can make *top-quality* installations, too, with SPANG Conduit. As a result of *quality-control* during manufacturing, SPANG is uniform, easy to install, highly resistant to corrosion. You can't buy a better conduit, so try it on your next job. Call your local SPANG Distributor for *top-quality service.*

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SPANG Conduit protects the wiring systems throughout the entire $2,250,000 building. Final check of wiring and conduit is made by Mr. Jackson.

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Our speaker will be Leo P. Aikman, *Atlanta Constitution* columnist—he's hilarious and will have you rolling in the aisles.

Menu:

- Fruit Juice
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Guests will be the SEWA members and their wives, so make your plans to attend.

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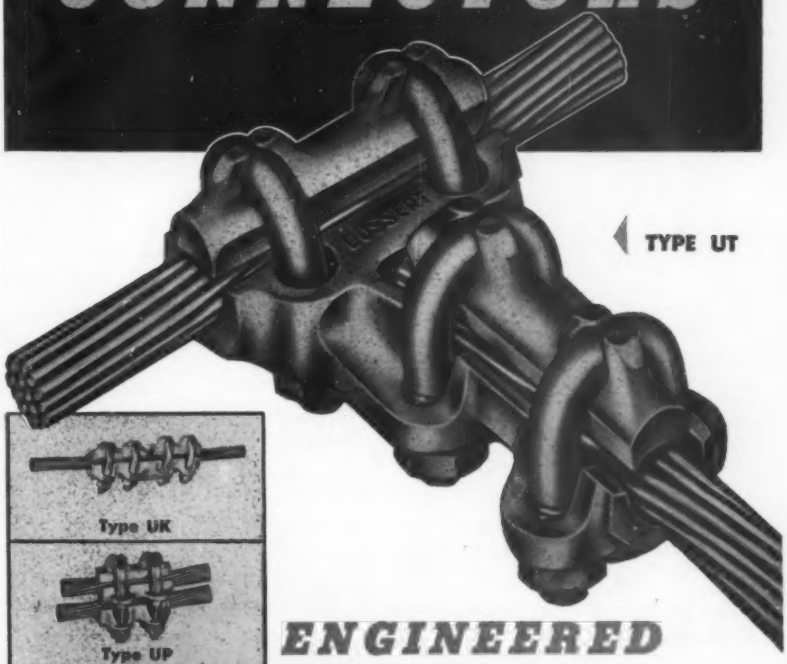

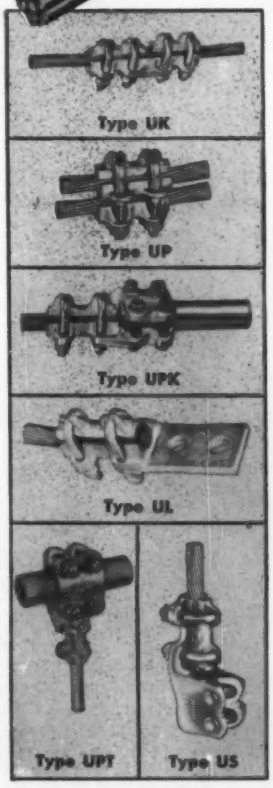

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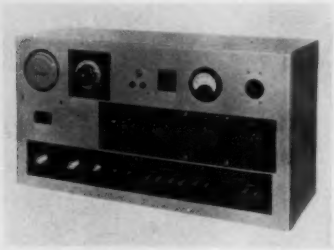
Notes on new utility equipment

Current transformer tester includes multirange standard

KNOPP INC., of 1307—66th St., Oakland 8, Calif., has announced its Uniload current transformer testing equipment for high accuracy and reliable test results. For use as the standard of comparison, the Knopp



precision multirange current transformer is included. Two auxiliary instruments are required: a suitable ammeter and a low-capacity zero-center wattmeter.

The type AT-6 Knopp Uniload current transformer is for the calibration of current transformers of the following ratings: 5, 10, 15, 20, 25, 30, 40, 50, 75, 100, 150, 200, 300, 400, 500, 600, 800, 1000, 1200, and 1500 amperes.

For additional data, ask for item U-1101, using the coupon on page 104.

Molded potential transformer for metering applications

A MOLDED potential transformer (Type EMP) is now available from the Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

Molded in polyester, the new transformer is for metering applications, either indoor or outdoor. The new unit is a companion model for use with the polyester molded Type EMR and EMO current transformers.

Voltage rating is 480-120 volts, 60 cycles. It has a thermal capacity of 150 va and will operate within the 0.3 ASA accuracy class on practically all single meter installations. Multimeter installations can be handled with the same accuracy classification of the over-all burden does not exceed 12.5 va at 10 per cent power factor.

For additional data, ask for item U-1102, using the coupon on page 104.

Sangamo Electric extends watthour meter guarantee

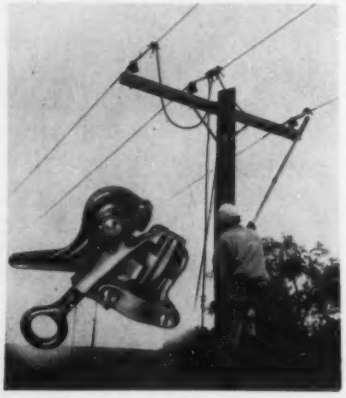
ANNOUNCEMENT has been made by Sangamo Electric Co., of Springfield, Ill., that all single-phase and polyphase watthour meters, as well as the watthour meter section of all combination metering instruments, are now guaranteed for life. This guarantee includes the materials and workmanship on the meters, and a statement that the ball and jewel bearing system will never need relubrication, inspection, or replacement.

Meters covered by the guarantee contain a cobenium ball and sapphire jewel bearing system which has been treated with Molykote® Microsize, a most highly purified molybdenum disulphide. These meters include all single-phase watthour meters with serial numbers above 21,900,000; all polyphase meters with serial numbers above 18,250,000; and all Lincoln combinations with serial numbers above 823,000.

For additional data, ask for item U-1103, using the coupon on page 104.

Grounding clamps increase jumper terminal capacity

A NEW LINE of grounding clamps—featuring greater strength, lighter weight, and increased jumper-termi-



nal capacity — is introduced by the A. B. Chance Co., 210 North Allen St., Centralia, Mo.

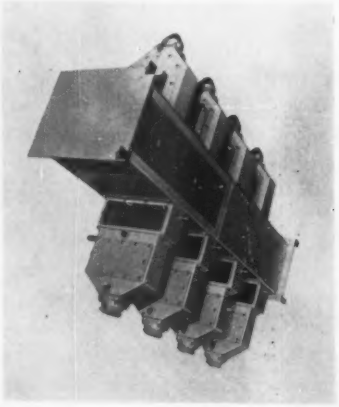
High-strength, heat-treated aluminum alloy is used where possible throughout the design of these clamps to hold weight to a minimum. High-strength bronze is used elsewere in the clamp design. Clamps are available as single clamps or in clusters, in either eyescrew or pole-mounted types. Poles are coated with Maplac* plastic to guard against moisture absorption and abrasion. Cable-insulation anchor straps on the clamps grip 5000-volt grounding cable firmly.

To assure the performance and to verify the ratings of the clamps, they have been thoroughly tested. Load-current, short-circuit-current, resistance-measurement, application-performance, and torque tests have been made.

For additional data, ask for item U-1104, using the coupon on page 104.

Disconnect and bus duct combined in one unit

ADDITION of a new product to their Isolator line has been announced by the Electrical Engineers Equipment Co., Melrose Park, Ill. The Iso-Duct



is a combination of the disconnect Isolator and the bus duct, arranged for future extension in either direction.

Design allows for any number of Isolator and pothead combination that can easily be interchanged when re-arrangements are necessary. Iso-Ducts are particularly advantageous for plants where power demands vary and are an excellent way to keep down future expansion costs. This design makes good use of all the patented Isolator features; the working parts of the Isolator are fully enclosed at all times for complete protection, and the straight line telescoping action performs disconnect operations using one-third the space needed for a comparable blade type switch.

For additional data, ask for item U-1105, using the coupon on page 104.

Standardization calibrator for a-c and d-c instruments

FULL-SCALE production of a general-purpose standardization console able to calibrate a-c and d-c current and voltage instruments has been announced by General Electric, of Schenectady 5, N. Y.

The completely self-contained con-

SORGEL — the Quietest dry-type transformers at standard prices

WE GUARANTEE that the sound levels of ALL Sorgel dry-type transformers are well below the established standards in ALL ratings up to 3000 Kva, and all voltages up to 15,000 volts. This has been an outstanding feature in Sorgel transformers for many years; in fact, we are the **originators** in establishing low sound levels.

OUR MODERN TESTING FACILITIES enable us to prove the low sound level, efficiency, temperature rise, and performance of Sorgel transformers, before installation.

COST LESS TO INSTALL, because they are all self-contained in a single unit — either single phase or 3-phase — equipped with substantial wall brackets or floor mounting base. No separate brackets to make or buy. Easily accessible, roomy connection compartment, with wide choice of knockouts. Solderless terminals.

OTHER INSTALLATION SAVINGS. SORGEL dry-type transformers are so quiet that they can be installed in any convenient place inside of buildings, close to load centers. This results in shorter feeders, better voltage regulation, more efficient distribution, and lower wiring cost.

LIBERAL DESIGN, HIGH EFFICIENCY. SORGEL dry-type transformers are guaranteed to carry their full rated load continuously at high efficiency. They are so liberally designed that they can carry an overload during an emergency at a safe operating temperature. Vacuum impregnated windings brazed to solderless terminals assure years of trouble-free service.

TIME-TESTED. Nearly half a century of transformer development, engineering and manufacturing experience, have been incorporated in the design and construction of Sorgel transformers.

HIGHEST ENDORSEMENT. Sorgel Sound-Rated transformers have earned the highest endorsement of leading engineers and users.

Available in all standard and intermediate ratings. ¼ to 3000 Kva, and from 120 volts to 15,000 volts.

15 to 50 Kva 3-phase. Wall mounting. Connection compartment panel removed

SORGEL TRANSFORMERS

Sales engineers in principal cities.

Consult the classified section of your telephone directory or communicate with our factory.

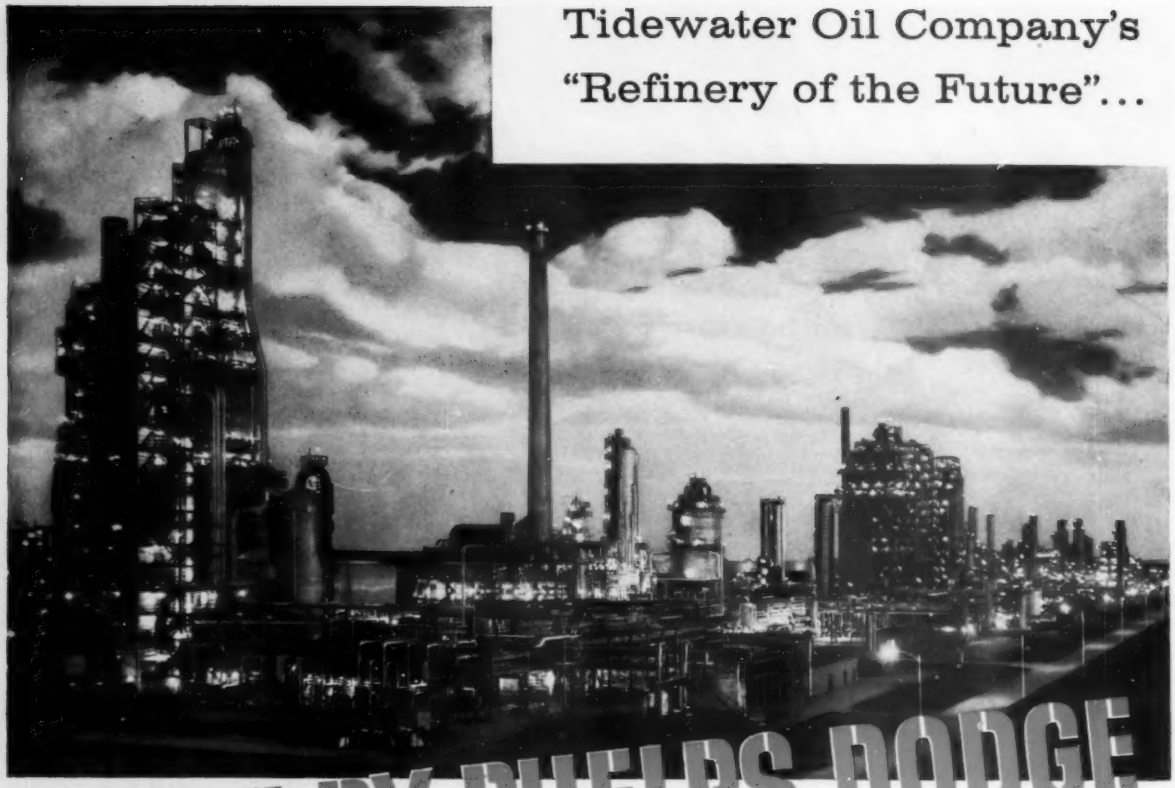
Substations

The same quiet Sorgel transformers are also incorporated in substations. Procurable with any type or make of switchgear, or from any substation manufacturer.

3-phase versus 3 single phase

Save on installation cost by installing a Sorgel 3-phase unit instead of 3 single phase transformers. Available in 3 Kva to 3000 Kva, and all voltages up to 15,000 volts.

SORGEL ELECTRIC CO., 835 West National Ave., Milwaukee 4, Wisconsin



Tidewater Oil Company's
"Refinery of the Future"...

WIRE BY PHELPS DODGE

The gigantic new refinery of the Tidewater Oil Company near Delaware City, Delaware, boasts a number of noteworthy features. It is the largest refinery ever built at one time; six of its eleven major processing units are the largest yet constructed; and the amazing capacity of this remarkable installation totals 130,000 barrels-per-day.

One of the important requirements for this advanced refinery was electrical wires and cables of the highest quality. That's why Phelps Dodge bare wire, TW, RH-RW and rubber-neoprene cables, paper-insulated cable and arc welding cables were used.

On every wiring job where top-quality performance, expert workmanship and experienced "know-how" are called for, *it pays to rely on Phelps Dodge and your Phelps Dodge distributor!*

PHELPS DODGE COPPER PRODUCTS CORPORATION

SALES OFFICES: Atlanta, Birmingham, Ala., Boston, Buffalo, Charlotte, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Fort Wayne, Greensboro, N. C., Houston, Jacksonville, Kansas City, Mo., Los Angeles, Memphis, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Ore., Richmond, Rochester, N. Y., San Francisco, St. Louis, Seattle, Washington, D. C.

sole provides power source, control, and circuitry for high-accuracy instrument standardization, including the design, development, and service calibration of practically all types of electric instruments.

These instruments range from microvolts and micro-amperes to several hundred volts or amperes—a measurement range of nearly 109. The console is most widely used for the calibration of portable, small panel, switchboard, and recording-type instruments.

Designed to reduce downtime losses and expense in standardizing working instruments, the new console can calibrate instruments in minutes and eliminates the need for stocking emergency replacements, or dismantling, packing, and shipping instruments to an outside source for standardization service.

The space-saving console—with all necessary operating equipment—measures 6 ft. long, 4 ft. wide, and 5 ft. high. Design simplicity permits rapid, easy calibration by non-skilled workers, and console circuitry provides safety features that make it virtually impossible to damage the instruments on test or the console.

A simple a-c/d-c switching facilitates use of the "transfer standards" method for standardizing a-c instruments. The transfer standards method—as opposed to the "comparison" method—transfers a-c values to the more easily and accurately measured d-c values. Instrument engineers emphasized the transfer standards method has many advantages, including the widest range of standardization, at the highest accuracy, at minimum investment in measurement standards.

With the new console, d-c measurements are accurate to 0.01 per cent, a-c measurements to 0.05 per cent, depending on reference standards used. Regulated power is supplied in the audio-frequency range of 50 to 3000 cycles per second, and both a-c and d-c voltage and current supplies are provided in conventional separate bus facilities up to 150 amperes, 750 volts.

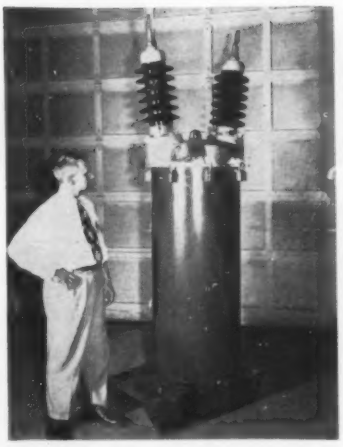
For additional data, ask for item U-1106, using the coupon on page 104.

Automatic circuit recloser for 46 kv maximum service

AN AUTOMATIC circuit recloser for 46 kv maximum service application has been announced by the R&IE Equipment Division of I-T-E Circuit Breaker Co., Greensburg, Pa.

Interrupting ratings have been established at 4000 amperes, rms symmetrical, for 34.5 kv; and 3000 amperes, rms. symmetrical, for 46 kv continuous current ratings are 400, 280. 140, and 100 amperes.

Two cycle instantaneous tripping of transient faults. followed by 25 cycle reclosing with one, two, or three inverse-time operations provides the same low cost improvement of service reliability at these higher voltages that has distinguished recloser performance at distribution voltages.



The new recloser can be mounted on ground racks, or on structures or poles. Total weight is 975 pounds, with an oil content of about 150 gallons.

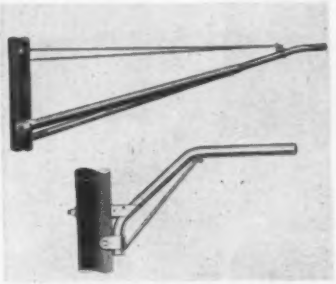
For additional data, ask for item U-1107, using the coupon on page 104.

Street lighting brackets improve horizontal deflection

A NEW LINE OF galvanized steel street lighting brackets for fluorescent luminaires has been developed by Hubbard and Co., 6301 Butler St., Pittsburgh 1, Pa.

Designed to provide improved horizontal deflection characteristics, the new brackets, with mounted luminaires having up to 8 square feet of projected area, will withstand wind velocities up to 100 miles per hour. They eliminate the tendency of luminaires to "dance" during high winds.

Made of 2-inch pipe, the brackets are reinforced to dampen vibration. They are made in styles that maintain architectural similarity with brackets already in use. The larger brackets are reinforced with angle members.



The upsweep bracket, shown in the small picture, is available in nominal 3-foot and 4-foot sizes. An adaptation of this is available in 4-foot, 6-foot, and 8-foot sizes.

The mast arm bracket, shown in the large picture, is available in 10, 12, 14, 16, 18, and 20-foot sizes. A total of five styles is available.

For additional data, ask for item U-1108, using the coupon on page 104.

Cable splice insulating kit with thermosetting material

THE ACME WIRE CO., 1255 B Dixwell Ave., New Haven, Conn., has redeveloped and greatly improved their "AS" series cable splice insulating kits. These poured type kits feature the use of an Epoxy-Thiokol thermosetting material, Acme-developed for this special application and a transparent plastic mold.

This is the first of a series of new products which The Acme Wire Co. will offer to electric utilities, and the company has created a new Electrical Utilities Division to handle the manufacturing and sale of these new products. Its sales will be handled on a nationwide basis through manufacturers' representatives. The Acme Wire Co. is a specialist in the field of electrical insulations and for 54 years has been producing semi-finished raw materials for the electrical industry.

Acme's new kits are for use on single conductor cables with rubber-neoprene insulations or the equivalent up to 5000 V. They may be used also on lead or aluminum sheathed oil-impregnated cables. The Epoxy-Thiokol resin has a strong bond to rubber, neoprene, copper, lead, and aluminum.

There are three easy-to-follow steps. First, prepare cable and mold, and fit mold into position over center of connector. Second, cement mold at designated points and bind ends to cable insulation with tape provided. Third, mix and pour Acme compound into mold. Compound will set in from 10 to 20 minutes and splice is completed.

These kits may be used under severe weather conditions and in both aerial and underground installations. Experience indicates splicing time is reduced by two-thirds.

For additional data, ask for item U-1109, using the coupon on page 104.

YOU DON'T NEED A "ROAD MAP"

1-POLE
15-50 Amps

2-POLE
15-70 Amps

3-POLE
15-50 Amps

Write for the complete story
Square D Company,
6060 Rivard Street, Detroit 11, Michigan

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY

Electrical South Data Sheets — Series III — Electrical Estimating

TO USE THE QO® BREAKER!

NO GUESS-WORK!

There's just ONE ARRANGEMENT. 2-pole breakers go anywhere on the bus assembly. You don't need a wiring diagram to tell you where to put them. And there's no limit on the number of 2-pole breakers you can use. The same applies on 3-pole breakers for 3-phase jobs.

ONE FULL-SIZE BREAKER!

Each pole in its own case and all poles are the same size. Double-pole breakers take only two single-pole spaces—3-pole breakers only three. No more.

LESS MONEY TIED UP IN STOCK!

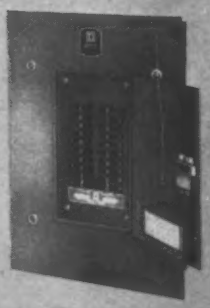
Only one kind of breaker for all load centers—*no duplicate stocks.* The same breaker for panelboards —*no duplicate stocks.* This is true for all the ampere ratings in 1-pole, 2-pole and 3-pole breakers. Incidentally, the 3-pole breaker comes in mighty handy for 3-phase air-conditioning loads, because it fits on the same bus. No separate box needed.

AND HERE'S THE BIG PAYOFF —THERE'S JUST ONE QUALITY!

There's no sacrifice in quality or features to save space. All **QO** breakers, including single-pole, are quick-make, quick-break, temperature corrected and have sensitive magnetic trip to protect against "flash" shorts. Judged on any basis of comparison, the **QO** is the finest breaker ever built!

QO ...*THE "NO CALL BACK" BREAKER*

NAME THE JOB AND THE QO CAN DO IT—*EXACTLY*



Panelboards
1-Phase or 3-Phase
Lugs or Main Breaker
14" or 20" wide boxes
4" or 5¾" deep

Column Panelboards
1-Phase or 3-Phase
Lugs or Main Breaker
with 1, 2 and 3-pole branches

Load Centers
1-Phase or 3-Phase
2 to 42 circuits
Lugs or Main Disconnect
Service Entrance—
Split bus type

Raintight Enclosures
2 through 30 circuits

New, revised estimating tables continued in this issue

A NEW SERIES of estimating tables, completely revised in the light of more recent jobs and experience, are presented in this issue and will appear from month to month in forthcoming issues. These electrical estimating data sheets cover labor only and are arranged alphabetically with the basic material headings as a title for each tabulation.

Labor units given in these tabulations are based on a minimum of interference during work progress. The averages listed do not provide for abnormal job conditions, and any such abnormal conditions will require adjustments by the user, based on his experience.

The work units covered by each table are composed of one or more separate but closely related operations necessary for the complete installation of a particular basic item of electrical equipment. These operations associated with the basic material are described at the bottom of each table.

Most of the electrical estimating tabulations follow the same form. Column 1 at the left shows the size of the material to be installed. The second column from the left gives the time required to install the material, and it should be noted especially that this "productivity" column may be based on individual units or in the case of cable or conduit on units of 100 feet or 1,000 feet. The abbreviations "Ea." for each, "C" for hundreds, and "M" for thousands in Column 2 indicate the basis of the labor hours.

Columns 3 to 13, from the left, give the actual labor costs in dollars per unit of installation, at various hourly wage rates.

When calculations are being made for an hourly wage rate that doesn't correspond to any of the rates listed in Columns 3 to 13, the user may multiply the number of hours in Column 2 by 100 and this will give the labor cost based on an hourly wage rate of $1 per hour. By multiplying this by the hourly wage rate that actually applies in the user's locality, the exact labor cost of the operation may be obtained. Labor costs obtained in this way will be for units, hundreds of feet, etc., as given in heading of Column 2 of the table.

The labor units covered by the tables represent direct job labor costs and do not include delivery of material to site, engineering, estimating, or any other indirect cost.

As will be noted, some of the electrical estimating tabulations to be given will be for independent operations, such as excavating, backfilling, etc. These are included for use in preparing estimates on work of a special nature not covered under a specific table heading.

Tables will appear in alphabetical order.

FIBER CONDUIT FITTINGS (CONCRETE)
BELL ENDS AND PLUGS (ADD AS REQUIRED)

CONDUIT SIZE	HRS EACH	LABOR COST EACH AT FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
1"	.21	.263	.315	.368	.42	.473	.53	.58	.63	.68	.74	.79
2"	.25	.313	.375	.438	.50	.56	.63	.69	.75	.81	.88	.94
3"	.27	.338	.405	.473	.54	.61	.68	.74	.81	.88	.95	1.01
4"	.32	.40	.48	.56	.64	.72	.80	.88	.96	1.04	1.12	1.20
4 1/2"	.32	.40	.48	.56	.64	.72	.80	.88	.96	1.04	1.12	1.20
5"	.37	.46	.56	.65	.74	.83	.93	1.02	1.11	1.20	1.30	1.39
6"	.42	.53	.63	.74	.84	.95	1.05	1.16	1.26	1.37	1.47	1.58
		EXPANSION JOINTS (ADD AS REQUIRED)										
1"	.48	.60	.72	.84	.96	1.08	1.20	1.32	1.44	1.56	1.68	1.80
2"	.55	.66	.80	.93	1.06	1.19	1.33	1.46	1.59	1.72	1.86	1.99
3"	.58	.75	.87	1.02	1.16	1.31	1.45	1.60	1.74	1.89	2.03	2.18
4"	.69	.86	1.04	1.21	1.38	1.55	1.73	1.90	2.07	2.24	2.42	2.59
4 1/2"	.74	.93	1.11	1.30	1.48	1.67	1.85	2.04	2.22	2.41	2.59	2.78
5"	.85	1.06	1.28	1.49	1.70	1.91	2.13	2.34	2.55	2.76	2.98	3.19
6"	.95	1.19	1.42	1.66	1.90	2.14	2.38	2.61	2.85	3.09	3.33	3.56

E-102-B

LABOR: Includes handling material at site, layout, tying, installation, cutting and tooling as required.

11-57

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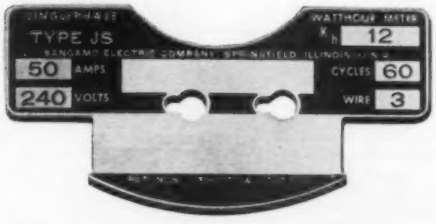
Electrical South Data Sheets — Series III — Electrical Estimating

What's new in Class 200 Meters?

With more and more 200 ampere service entrance equipment being installed every day, it's sound practice to match service capacity with metering capacity.

The Sangamo Class 200 Meter can accurately measure all loads—from a few watts to full 200 ampere capacity. Yet the development of 200 ampere capacity meters is nothing new with Sangamo. The Class 200 Meter is backed by 17 years of *proven performance.*

THE NAMEPLATES TELL THE STORY...



IN 1940

Sangamo introduced the Type J Meter, a radical departure in singlephase meter design. It accurately registered loads as great as 200 amperes. The 50 amp. J Meter gave excellent load curves up to such loads as the current carrying capacity of the terminals would allow. These J Meters are on your system—available to do tomorrow's job.

IN 1955

Sangamo developed the J2 Meter—the first extended range meter—a refinement of the basic J Meter. The Type J2 incorporated many improvements over the Type J . . . increased bearing life, higher resistance to surge voltage, superior voltage characteristics, improved corrosion resistant finishes and materials. The 50 amp. J2 Meter offered straight line accuracy to 200 amperes with only 18 starting watts. These meters are on your lines—ready and waiting for bigger loads.

NOW

Sangamo builds its proven 200 ampere meter as the Class 200, 30 Ampere J2S Meter—with proven accuracy to 200 amperes, lower disk speed, high starting torque, low starting watts.

Make this *proven* Class 200 Meter first choice to measure your ever growing needs. For further information and prices, contact your nearest Sangamo Representative, or write us.

JM57-7

SANGAMO
Electric Company

SPRINGFIELD, ILLINOIS

FIBER CONDUIT (NO CRETE CONDUIT)
STRAIGHT RUN ONLY

COND. SIZE	HOURS "C"	LABOR COST PER FT. OR EACH AT FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
2"	3.9	.049	.059	.068	.078	.088	.098	.107	.117	.127	.137	.146
3"	4.5	.056	.068	.079	.09	.101	.113	.124	.135	.146	.158	.169
4"	5.4	.068	.081	.095	.108	.122	.135	.149	.162	.176	.189	.203
		45 DEGREE ELBOWS 90 DEGREE BENDS (ADD AS REQUIRED)										
2"	.32	.40	.48	.56	.64	.72	.80	.88	.96	1.04	1.12	1.20
3"	.37	.46	.56	.65	.74	.83	.93	1.02	1.11	1.20	1.30	1.39
4"	.42	.53	.63	.74	.84	.95	1.05	1.16	1.26	1.37	1.47	1.58
				OFFSETS (ADD AS REQUIRED)								
2"	.42	.53	.63	.74	.84	.95	1.05	1.16	1.26	1.37	1.47	1.58
3"	.47	.59	.71	.82	.94	1.06	1.18	1.29	1.41	1.53	1.65	1.76
4"	.53	.66	.80	.93	1.06	1.19	1.33	1.46	1.59	1.72	1.86	1.99
				ADAPTERS (TO STEEL) (ADD AS REQUIRED)								
1" to 2"	.26	.325	.39	.455	.52	.59	.65	.72	.78	.85	.91	.98
2" to 3"	.32	.40	.48	.56	.64	.72	.80	.88	.96	1.04	1.12	1.20
3" to 4"	.37	.46	.56	.65	.74	.83	.93	1.02	1.11	1.20	1.30	1.39

E-102-B

LABOR: INCLUDES CUTTING, TOOLING ENDS, INSTALLING STRAIGHT RUNS AND HANDLING MATERIAL AT SITE.

11-57

FITTINGS - FIBER CONDUIT "NO CRETE"
BELL ENDS AND PLUGS (ADD AS REQUIRED)

COND. SIZE	HOURS EACH	LABOR COST EACH AT FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
2"	.27	.338	.405	.473	.54	.61	.68	.74	.81	.88	.95	1.01
3"	.29	.363	.435	.51	.58	.653	.73	.80	.87	.943	1.02	1.09
4"	.32	.40	.48	.56	.64	.72	.80	.88	.96	1.04	1.12	1.20
		EXPANSION JOINTS (ADD AS REQUIRED)										
2"	.53	.66	.80	.93	1.06	1.19	1.33	1.46	1.59	1.72	1.86	1.99
3"	.55	.69	.83	.96	1.10	1.24	1.38	1.51	1.65	1.79	1.93	2.06
4"	.64	.80	.96	1.12	1.28	1.44	1.60	1.76	1.92	2.08	2.24	2.40
		REDUCERS (ADD AS REQUIRED)										
1" to 2"	.27	.338	.405	.473	.54	.61	.68	.74	.81	.88	.95	1.01
2" to 3"	.32	.40	.48	.56	.64	.72	.80	.88	.96	1.04	1.12	1.20
3" to 4"	.38	.475	.57	.67	.76	.86	.95	1.05	1.14	1.24	1.33	1.43

E-103-B

LABOR: INCLUDES HANDLING AT SITE, LAYOUT, TYING AND INSTALLATION, CUTTING AND TOOLING AS REQUIRED.

11-57

Electrical Estimating—III

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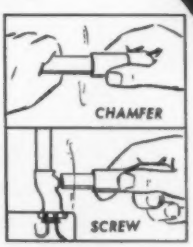
DURO... the only complete line of Set Screw Fittings*

Specially designed cutter reams both inside and outside of metal tube at same time.



U. S. PAT. NO. 2,797,420

Self centering screw driver speeds work . . . reduces accidents.

U. L. APPROVED

handy 3 in 1 TOOL

COMBINATION NON-SLIP SCREWDRIVER AND INSIDE-OUTSIDE EMT CHAMFERRING TOOL

Fits all brands of EMT Set Screws . . . Terrific in hard to get places . . . electrical panels . . . many other uses.

U. S. PAT. NO. 2,497,126

ONLY* DURO *SET SCREW FITTINGS HAVE ALL THESE GREAT FEATURES

Every size thru 2"

★

All sizes INSULATED FITTINGS thru 2"

★

Complete range of Offset Fittings

★ ★ ★

Each fitting is fully threaded and carefully sized. All have large, pan head staked screws that back off clear without breaking stake.

DURO

Write for catalog

FITTINGS COMPANY

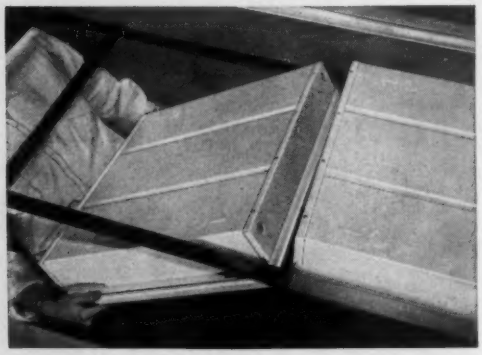
2210 SOUTH DAVIE AVENUE · LOS ANGELES 22, CALIFORNIA

*ALL STEEL FITTINGS

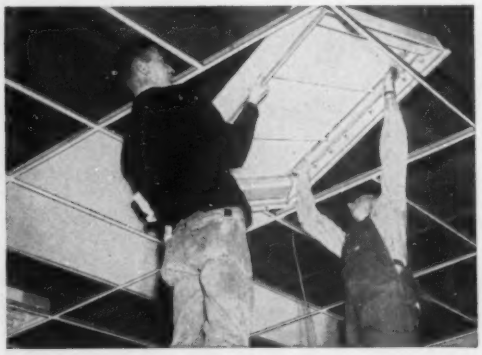
MAINLINER LUMINAIRES

1 WIDEST VARIETY 2 "TOP" APPEARANCE

Lighting that *often* increases retail departmental sales as much as 300% is provided by Mainliner Luminaires, and featured *throughout* all departments of the great new Montgomery Ward store located at Portsmouth, Ohio.



Mainliner Luminaires, all, are simple to mount in continuous rows. Fixtures, as shown here, are merely butted, and then bolted together through the abundant knockouts. No connectors are necessary. These are Tee-Bar units.



Mainliner special reinforcement makes handling "firm" and easy. Dimensional correctness keeps installations perfectly "square," with no need for "readjustment!" 4'x4' units, here, rest on Tee-Bars, need no added support!

LIGHT WARD'S NEW PORTSMOUTH STORE

3 SPEED, EASE, LOW COST OF INSTALLATION!

Mainliners—the industry's newest and most advanced luminaires—by Westinghouse—as in the new Montgomery Ward's store--are proving first choice of architects, lighting engineers and contractors alike!

Specification of Mainliners, by top professional men in the building industry, is due to Mainliner superiority on three specific counts: (1) Widest selection available in the industry! (2) Highest quality appearance! (3) Engineering, design and construction that *save installation costs three ways!*

Mainliner Widest Variety! 4 mounting types, 6 basic sizes and 13 shielding styles fulfill *any* large-area lighting requirement!—permit more than 1000 *all different* combinations! Modular proportions and *dimensionally correct* construction, of Mainliner Luminaires, "mate" with any type of "squared" ceiling material!

Highest Quality Appearance: Mainliner door-frames have *mitered* corners! Latches are flush, almost indiscernible. The extremely "shallow" design of Mainliner units gives a "patterned" rather than a "boxy" appearance, when they are surface-mounted. And, a black stripe applied to the light-trap seat—*eliminates* the escape of light from around the door-frames of Mainliner Luminaires!

Save Installation Costs 3 Ways! Rugged and reinforced Mainliner construction eliminates "crimping" and "wobbling"—for *much* easier handling! Mainliners come *completely pre-assembled!* Doors are packed separately. Cartons simply "rip" open. Mainliners cut *all* job-planning—job-layout—and luminaire-handling time!

Mainliners are only 4¾" deep! Easiest ever to position and mount! Recessed models include Flange-type, Grid-type and Snap-in Tee-Bar units. Surface-mounted units permit a semi-recessed appearance.

Mainliner doors, too, come pre-assembled—hinge and latch from either side. And, the *complete pre-wiring* of Mainliner Luminaires is *consistently* reported to *cut wiring-time in half!*

Get *all three* superior advantages of Mainliner Luminaires—through your near-by Westinghouse Representative—or through your own, local Westinghouse Distributor! J-04426-R

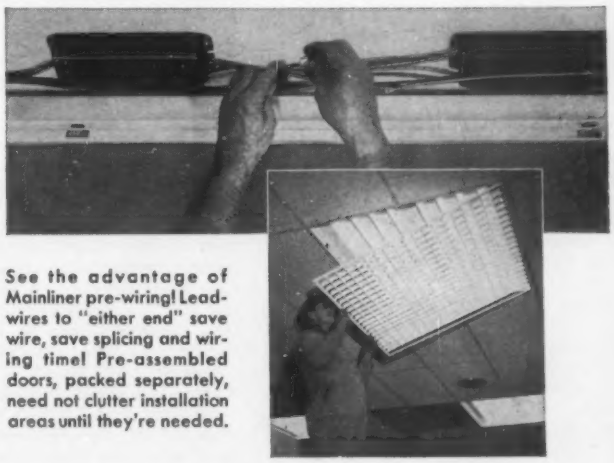
LIGHTING SALES CLINIC — Certified Lighting

Request a Mainliner presentation today!

YOU CAN BE SURE...IF IT'S

Westinghouse

See how easily various models from the wide variety of Mainliner Luminaires are applied for both functional and decorative lighting, *as well as* for "Merchandising" lighting, at the new Montgomery Ward store in Portsmouth.



See the advantage of Mainliner pre-wiring! Lead-wires to "either end" save wire, save splicing and wiring time! Pre-assembled doors, packed separately, need not clutter installation areas until they're needed.

News of the industry

edited for Southern readers

Double power capacity is generating challenge

THE NATION'S electric power utilities will be faced with the challenge in the next ten years — or less — to install as much generating capacity as has been installed during the 75 years of the electrical industry's existence, Glenn B. Warren, vice-president and consulting engineer, Turbine Division, General Electric Co., told the Rocky Mountain Electrical League meeting recently.

"The need for and the production of electric power in the United States historically has doubled every ten years over the past fifty years, and there seems to be little reason to believe that this rate of growth will not keep up for at least another two decades," Warren said.

Warren pointed out that "in no part of the world has the saturation point in the rate of growth of the electrical industry" been reached.

"Almost irrespective of the principal countries' of the world present level of electric development, their rate of growth from year to year is from 6 to 10 per cent or more in some cases. The doubling of the load in the United States as a whole, every ten years, amounts to between seven and eight per cent rise each year."

National Wiring Bureau elects new chairman

LESTER E. BARRETT, president of the Barrett Electrical Supply Co., of St. Louis, Mo., has been elected chairman of the National Wiring Bureau by the bureau's executive committee, on which he serves as a representative of the National Association of Electrical Distributors. He succeeds Carl T. Bremicker who has served as an Edison Electric Institute representative on the bureau's executive committee since 1953 and as its chairman since 1955.

When accepting the chairmanship of the bureau's managing body from Mr. Bremicker, Mr. Barrett said, "The vigorous leadership which the National Wiring Bureau has enjoyed during the past few years has indeed brought the bureau and its program into a dominant position in the electrical industry. The spirit of team work and coordination between the electric utility, contracting manufacturing and distributing branches of the industry, displayed by the members of this committee,

Lester E. Barrett

offer an ideal example to local electric industry groups throughout the country. I shall do my utmost to help maintain this splendid cooperative spirit."

NRECA spearheads "Minuteman" campaign

DELEGATES from 78 rural electric systems serving 342,897 farm families in Florida, Georgia and South Carolina met to kick-off a drive for "Minutemen for Rural Electrification" when the National Rural Electric Cooperative Association's Region II recently convened at the Henry Grady Hotel, Atlanta, Ga.

Highlighting the two-day program were addresses by NRECA General Manager Clyde T. Ellis and REA Administrator David A. Hamil.

Heading state delegations were P. W. Shelfer, Region II executive committeeman and Florida director; Walter Harrison, Georgia director, and T. W. Hunter, South Carolina director. Also representing the National service organization were William S. Roberts, director of the publications and member education department; Richard A. Dell, legislative representative, and Donald H. Dunham, director of the retirement, safety and insurance department.

The idea for rural electric "minutemen" was advanced at the July meeting of the NRECA board and is designed to achieve "greater acceptance and clearer understanding of our program and its problems." Educational volunteers will be organized by local rural electrics to discuss the co-ops' plans and problems with other members and their neighbors.

In addition to the Minutemen drive, delegates participated in workshop and panel sessions on cash reserves, public relations and power use.

Federal Pacific buys Penn Electrical Company

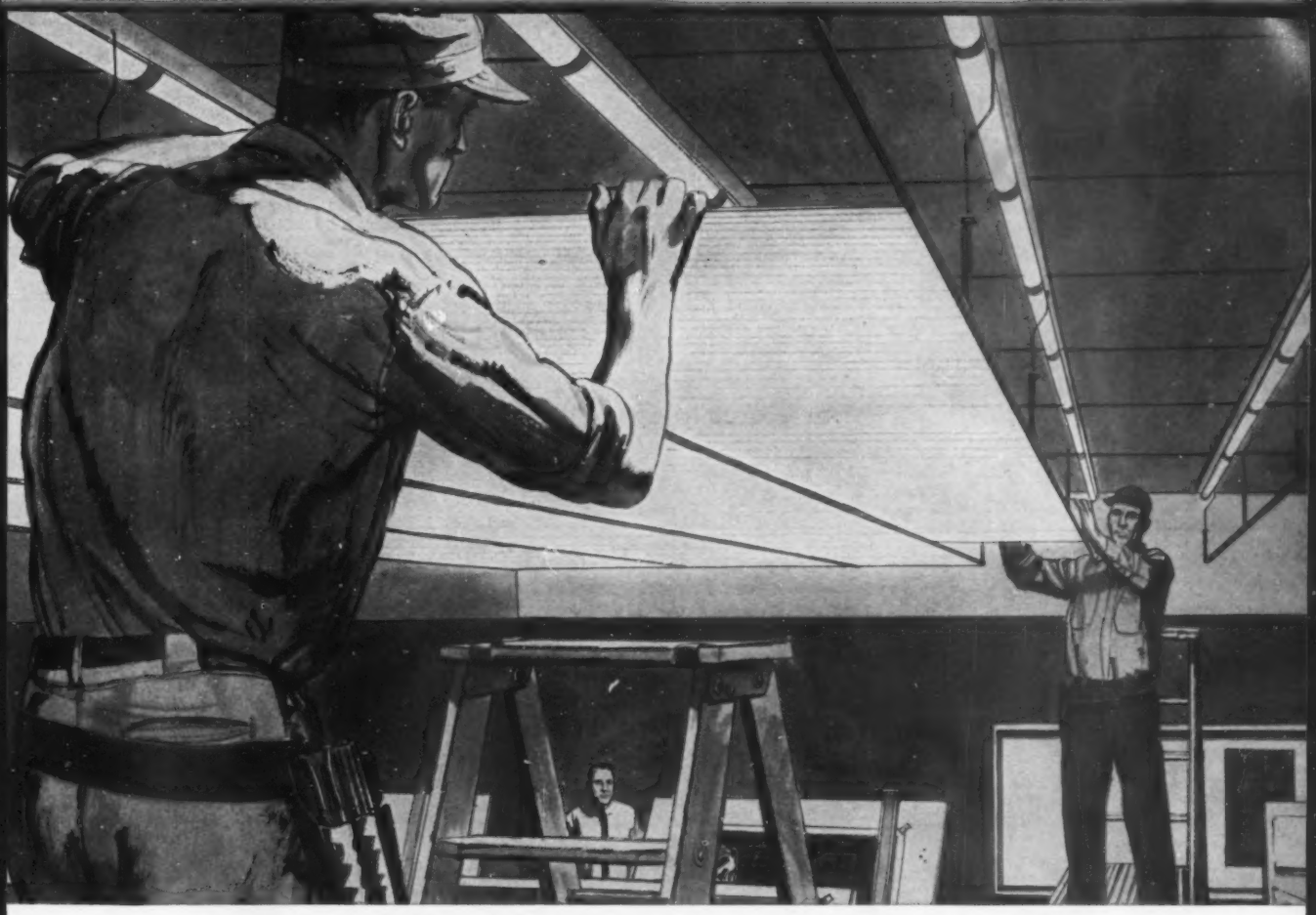
FEDERAL PACIFIC Electric Company announced that it is acquiring all of the outstanding common stock of the Penn Electrical Company in exchange for 20,600 shares of its own common stock. T. M. Cole, Federal Pacific executive vice-president expects the acquisition to strengthen the company market position in the Pittsburgh area industrial complex.

Mr. Cole explained the purchase as a logical step in his organization's program to expand its national network of regional manufacturing plants. "The parallel nature of Penn's production and Federal Pacific's operations," he said, "should enable us to offer better regional service to the electrical industry at less cost per sales dollar."

Penn Electrical Company will continue, under present management, to manufacture switchboards and panelboards to specification for institutions, industrial and commercial buildings, and public utilities. The firm sells principally in states east of the Mississippi River through salesmen and commission agents.

Interim Code amendment on motor controllers

◆ A TENTATIVE interim amendment to the 1956 edition of the National Electrical Code, Number 106, has just been released, effective September 25, 1957, by the



Fine craftsmanship and better production stem from easy seeing and uniform illumination. Here is an important project on which Graybar, located in over 130 principal cities, can give you or your customers real help.

Your best source of EVERYTHING IN LIGHTING ...is Graybar

Whenever you or your customers are confronted with the need for better lighting in any plant, office or warehouse area, talk with a Graybar lighting expert. For, whatever the requirements, he can give an impartial recommendation for the best lighting system for the need—from the most complete selection of lamps and lighting units available from any one source!

The Wakefield "Magic Ceiling," illustrated above, is an example. Units arrive on the job as a complete package: fluorescent strip lighting, straps, channels, grid and diffusers. No preliminary construction is required and the Magic Ceiling can be installed practically overnight.

New lighting developments such as this are constantly being announced by the manufacturers of America's best illumination equipment whom Graybar represents. Some of these are: Benjamin, Curtis, Day Brite, Pittsburgh, Silvray, Smithcraft, Wakefield, Wheeler, and Wilson. You and your customers have direct access to this current progress in lamps and lighting equipment when you work with the nearest Graybar office. 696-711

Write Graybar for your copy of "NEW INTERIORS FOR OLD"

which shows striking transformations made within a few hours by installing the "Magic Ceiling." This new lighting source comes in stock units to fit interiors of all sizes and shapes.

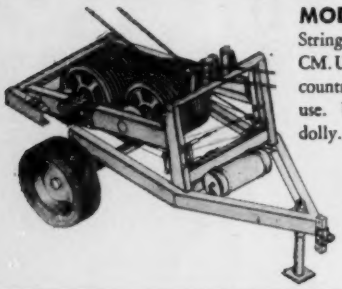
CALL GraybaR **FIRST FOR** Everything Electrical GraybaR ELECTRIC COMPANY

GRAYBAR ELECTRIC COMPANY, INC., 420 LEXINGTON AVENUE, NEW YORK 17, NEW YORK, IN OVER 130 PRINCIPAL CITIES

Partial showing of the now ***COMPLETE*** line of . . .

PENGO TENSION WIRE STRINGING EQUIPMENT

Manufactured By **PETERSEN ENGINEERING CO., *Santa Clara, Calif. 14 Patents Pending***

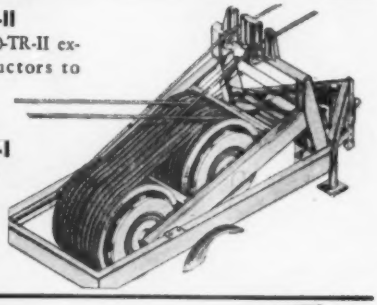


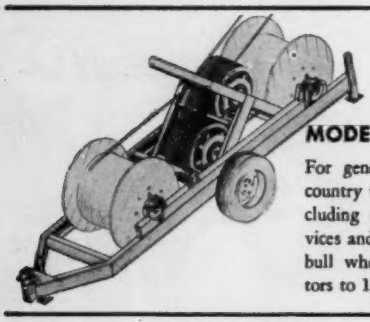
MODEL 5000-TR-II
Strings two conductors to 556,300 CM. Used primarily for very rough country work ; also for general use. Use separate reel-carrying dolly.

MODEL 5000-TR-I
Similar except strings one conductor.

MODEL 6000-TR-II
Similar to Model 5000-TR-II except larger. Conductors to 1,272,000 CM.

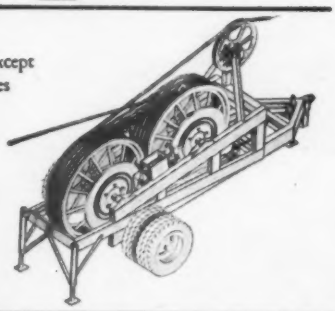
MODEL 6000-TR-I
Similar except for one conductor.

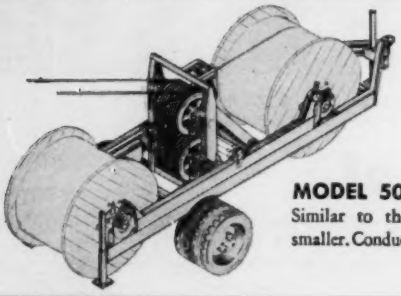




MODEL 6000-WS-TR
For general and medium rough country use. A complete unit including trailer, reel-carrying devices and its own double pair of bull wheels. Conductors to 1,272,000 CM.

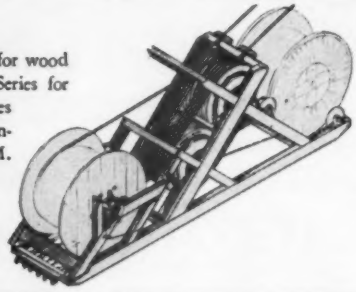
MODEL 7000-TR-I
Similar to model 6000-TR-I except larger. Conductors to 2 inches diameter.

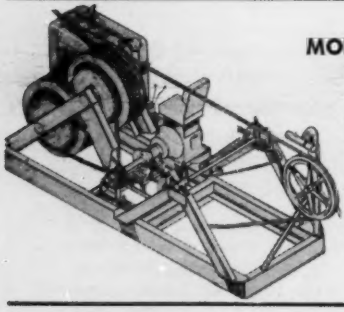




MODEL 5000-WS-TR
Similar to the 6000-WS-TR but smaller. Conductors to 556,300 CM.

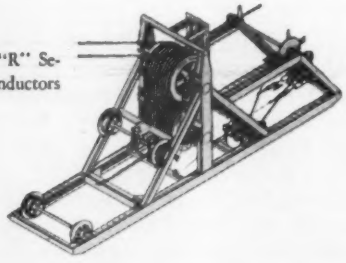
MODEL 6000-W
Available in "S" Series for wood or steel reels, in "R" Series for steel reels, or "SR" Series for trailer mounting. Conductors to 1,272,000 CM.

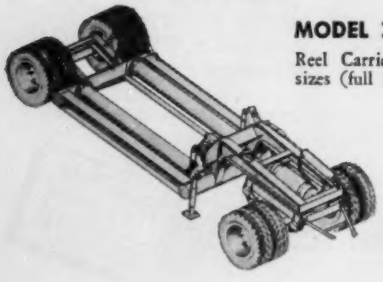




MODEL 6500
Bull Wheel Cable Puller. Available in "R" Series for steel reels, "S" Series for wood reels. Conductors to 1,272,000 CM. Also available in "LWR" Model for extra-large steel reels. Model 5500 similar (smaller).

MODEL 5000-SR
Available in "S" Series, "R" Series, or "SR" Series. Conductors to 556,300 CM.





MODEL 7500
Reel Carrier. Takes the largest sizes (full range) of steel reels. Loads and unloads with one man. No auxiliary equipment needed except the truck that pulls it. For use with any one of the tensioning machines shown on this page.

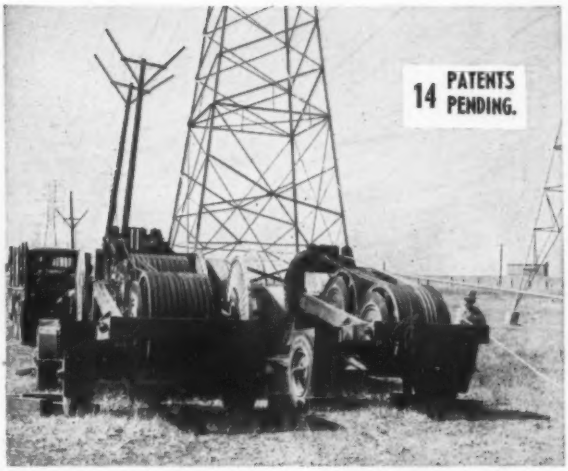
ADDITIONAL MODELS NOT SHOWN

Tension Reel Trailers

MODELS 2, 3, and 4, Two-Wheel Straddle Dollies not shown. For use with any one of the tensioning machines shown on these pages.

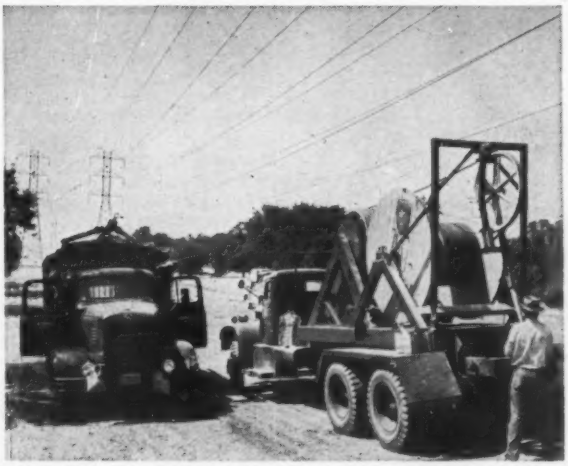
Tension Stringers

MODELS 6000-SK-I and 6000-SK-II For one or two conductors to 1,272,000 CM. Skid mounted for installation on owner's equipment.
MODELS 5000-SK-I and 5000-SK-II Skid mounted for installing on owner's equipment. For stringing one or two conductors to 556,300 CM.
MODEL 5000-WS-III Strings three conductors to 556,300 CM. For mounting on low-bed or full trailer.
MODEL 6000-WS-III Strings three conductors to 1,272,000 CM. For mounting on low-bed or full trailer.



Two PENGO model 6000 TR-II wire tensioners being used by Pacific Gas and Electric Co. in reconductoring job between Vacaville, Calif. and Cottonwood, Calif. 285 miles of 500 MCM copper is being replaced by 954 MCM aluminum in this operation.

Newest method of stringing overhead lines



Two PENGO model 6500 Bullwheel Cable Pullers used by Pacific Gas and Electric Co. for pulling in the new line on the job mentioned above. Unit, manned by an operator and one reel tender, pulls the pulling line (in this instance the old copper conductor) over the double neoprene lined Bullwheels and winds it for shipment in a single operation.

- ***Safest, most economical way of stringing transmission, distribution and even secondary lines.***
- ***Its greatest savings are effected when stringing over and through energized circuits . . . by far the safest, too!***
- ***14 Patents Pending!***

Smooth, postive control of conductor tension can be maintained at all times regardless of model or size of PENGO tensioning equipment used. The large, specially designed PENGO disc brakes are mounted away from the Bullwheels to assure dissipation of the heat generated by the continuous braking action and prevent transmission of the heat to the Bullwheels.

Note the wide range of models on the opposite page available for all types of jobs or terrain and for all sizes of conductor.

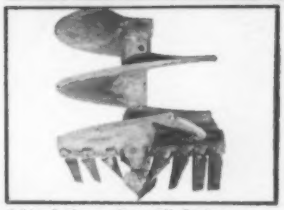
List your requirements and send for descriptive literature and prices.

Made by the makers of the World-Famous
PENGO EARTH AUGERS

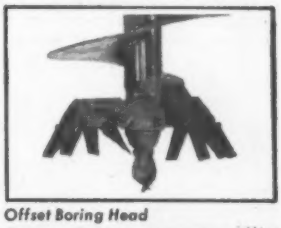
PETERSEN
ENGINEERING COMPANY
Santa Clara, Calif.

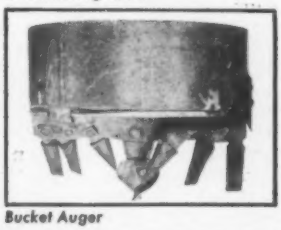
PETERSEN ENGINEERING CO.
Santa Clara, California **Dept. 19**
Please send me more information on the new Pengo wire stringing equipment.
Name_____
Firm_____
Address_____
City_____ State_____

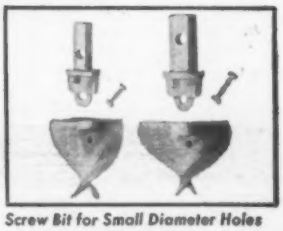
Other PENGO Products include:


24 inch Heavy Duty Flight Auger

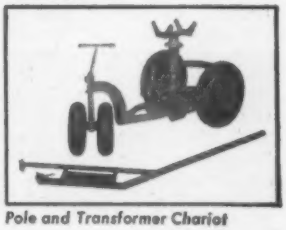
Double-Helix Heavy Duty Auger


Offset Boring Head


Bucket Auger


Screw Bit for Small Diameter Holes

Pulling Eye


Pole and Transformer Chariot

C. W. Higbee J. T. Dugall G. N. Houck E. K. Matteson W. G. Lawrence

National Electrical Code Committee of the National Fire Protection Association.

Interim amendment No. 106 deals with motor controllers as running overcurrent protection.

Text of the interim amendment follows:

"*Section 4328* — Delete the fine print code note at the end of the Section."

"*Section* 4329 — Motor Controller as Running Protection. A motor controller may also serve as the running overcurrent device if the number of overcurrent units complies with the foregoing Section 4327, and if these overcurrent units are operative in both the starting and running position in the case of a d-c motor, and in the running position in the case of an a-c motor. When a non-automatic motor controller serves as the running overcurrent device, it is recommended that all ungrounded conductors be opened."

The release of this amendment to the 1956 edition of the National Electrical Code is in accordance with NFPA policy of keeping its standards up to date to furnish guidance in proper installation of equipment and safeguarding of hazards in furtherance of the general objective of the Association to reduce loss of life and property by fire. The present amendment, like other NFPA standards, is the result of action by a representative national committee organized in the general public interest through participation of various important groups concerned.

This amendment, developed under the published Procedure for Tentative Interim Amendments, is recommended by the Committee for application in the administration of the 1956 edition of the National Electrical Code. It is subject to further consideration by the National Electrical Code Committee and official action by the National Fire Protection Association in connection with the next general revision of the National Electrical Code.

New Kaiser division names sales managers

THE APPOINTMENTS of Clarence W. Higbee as assistant general manager and Gillette N. Houck as sales manager of the newly established Electrical Conductor Division, Kaiser Aluminum & Chemical Corp., have been announced by J. T. Dugall, general manager of the division.

Two regional sales managers for the division have been appointed to supervise the sale of electrical conductor products in the company's newly formed southern sales regions.

Establishment of the Electrical Conductor Division is part of the company's recently announced move to divide its aluminum operations into five major divisions, each with responsibilities for both the production and sale of its products.

Mr. Higbee, a veteran of nearly 40 years in the electrical conductor industry, joined the company earlier this year when Kaiser Aluminum purchased the wire and cable business of the United States Rubber Co.

As sales manager for the division, Mr. Houck will be in charge of Kaiser Aluminum's nationwide sales program for electrical conductor products, serving electric utilities, industrial accounts, electrical wholesalers and original equipment manufacturers. Mr.

KYOVA SHIPS FIBER CONDUIT FROM NEW PLANT—W. D. Kyle, Jr., president of the Kyova Fiber Pipe Co., presents shipping papers on the first ten-foot lengths of bituminized fiber conduit to leave the new plant in Ironton, Ohio. Receiving the documents is D. E. Geiger, general manager of the Ben Williamson Co., electrical wholesaler of Ashland, Ky. At left is Jack M. Dollenmaier, Kyova vice-president. At far right is Clarence Maynar of the Williamson organization

"what? ...ME specify outdated high-bay lighting?"

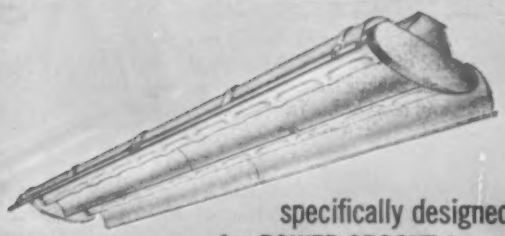
NOT ANY MORE! NEW ALL-BRITE PG FLUORESCENT DELIVERS MORE LIGHT AT LESS COST!

PG means fluorescent high-bay illumination, featuring **Power-Groove** lamps ... truly an industrial lighting milestone! Write for information.

All-Brite
LIGHT OF THE WEST

CONVAIR INSTALLS 3000 PG ALL-BRITE

Lighting Plan by Convair San Diego Plant #2. Electrical contractor, Chula Vista Electric Company.



specifically designed for **POWER-GROOVE** lamps

FLUORESCENT FIXTURES OF CALIFORNIA

352 SHAW ROAD
SOUTH SAN FRANCISCO, CALIF.

PLANTS ALSO IN LOS ANGELES; PORTLAND, OREGON; AND VANCOUVER, B. C., CANADA

Revere hinged pole with 3 floodlights and 5 par lampholders in use in Chicago area "drive-in."
Low cost lighting maintenance
REVERE

with Revere hinged poles

Hinged poles, engineered to hold from 1 to 4 floodlights, are available in round, square and square-tapered models in heights from 18 to 30 feet.

Reduce the cost of relamping, cleaning and maintenance by using Revere hinged poles in your outdoor lighting installations. No matter who provides lighting maintenance, it's performed more quickly, safely at ground level. The cost of using boom trucks is eliminated. Hazardous and time-consuming use of long ladders is avoided. First cost of Revere hinged poles is no more than ordinary light poles.

From a quality standpoint, Revere hinged poles are built for rugged duty and will withstand wind loading of 100 m.p.h. Check with your electrical supplier on other cost and quality advantages of Revere hinged poles.

Write for complete Revere catalog

Revere ELECTRIC MFG. CO.

Revere Electric Mfg. Co., 6009 Broadway
Chicago 40, Ill., UPtown 8-7100

Available in Canada thru Curtis Lighting, Ltd., Leaside, Toronto, Ontario

Outdoor Lighting: Industrial • Commercial • Service Stations • Streets • Sports • Airports • Shopping Centers

Houck joined Kaiser Aluminum in 1947 and has held a variety of sales and executive sales positions.

"The electrical conductor portion of Kaiser Aluminum's business has grown tremendously in the past few years, requiring an extensive, specialized sales organization and force of field engineers, as well as greatly expanded production facilities," Mr. Dugall stated.

"We firmly believe the new organizational structure will achieve better service to our customers. the highest quality products and continuing and orderly growth of the division."

The newly appointed regional managers for electrical conductor sales serving areas in the south are: W. J. Lawrence, Southeastern, Philadelphia; and E. K. Matteson, South Central, Kansas City.

Kaiser Aluminum's new Southeastern region comprises the Philadelphia, Atlanta and Miami districts. Mr. Lawrence has been functioning as branch manager at Birmingham, Alabama. He joined the company in 1951 as a sales trainee and later gained electrical conductor sales experience in Florida, Alabama and Tennessee.

The three districts in the South Central region are headquartered at Kansas City, Dallas and St. Louis. Mr. Matteson has been with Kaiser Aluminum since 1952 as a service engineer for electrical conductor products within the Chicago metropolitan area.

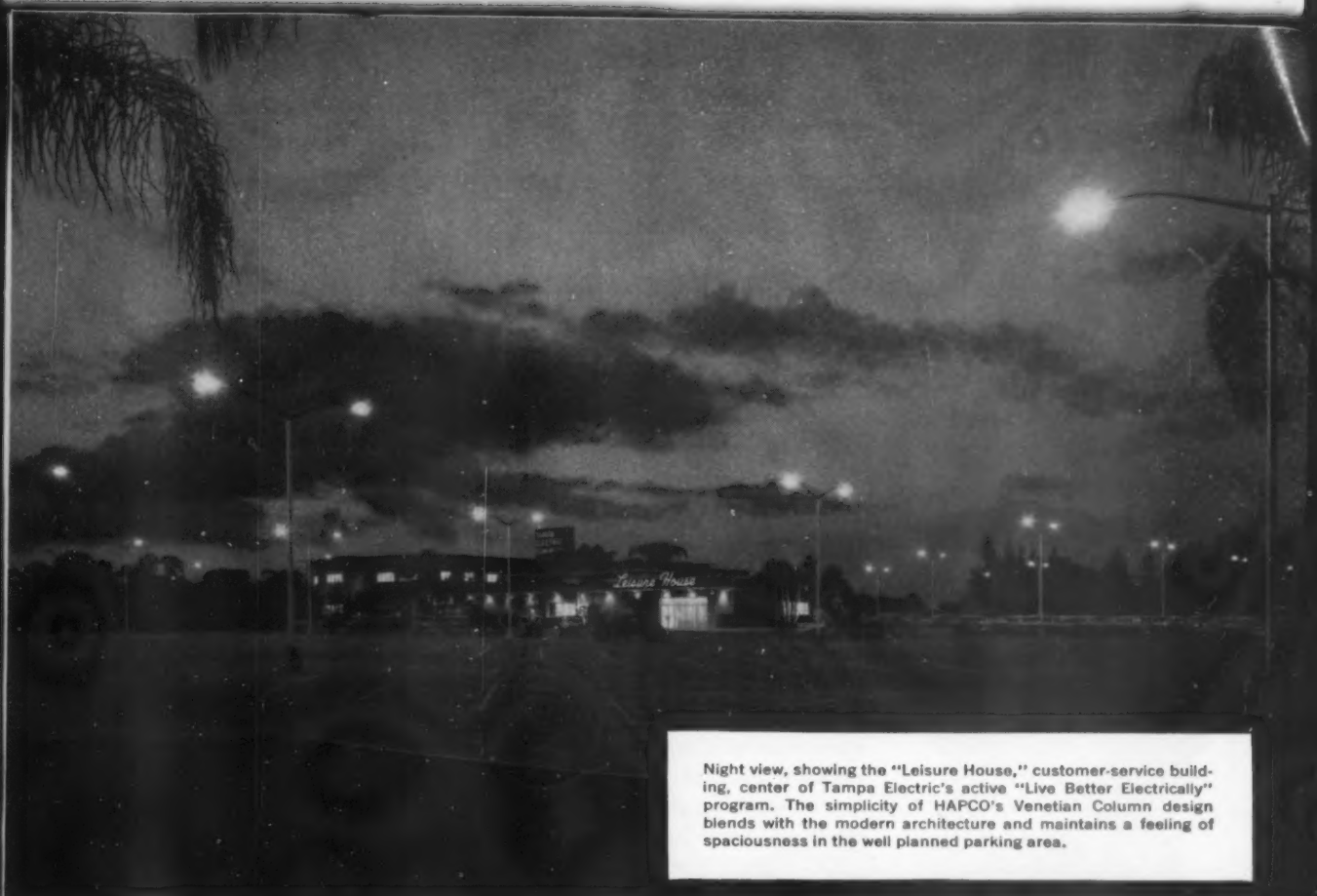
Porcelain Products merges Ohio low voltage plants

THE LOW VOLTAGE Division of Porcelain Products, Inc., formerly with offices at both Findlay and Carey, Ohio, consolidated all activities at the Carey location in September to increase operating efficiency.

This move did not affect the High Voltage Division of Porcelain Products which maintains offices and factory at Parkersburg, W. Va. Porcelain Products manufactures dry process porcelain for low voltage applications at Carey, and wet process porcelain for high voltage use at Parkersburg. The company is a subsidiary of A. B. Chance Co., Centralia, Mo., manufacturers of construction equipment for power and communications lines.

NEMA forms pole line hardware subdivision

POLE LINE HARDWARE manufacturers, whose products form vital links in the nation's transmission,



Night view, showing the "Leisure House," customer-service building, center of Tampa Electric's active "Live Better Electrically" program. The simplicity of HAPCO's Venetian Column design blends with the modern architecture and maintains a feeling of spaciousness in the well planned parking area.

For Tampa Electric Company...

Trim, modern appearance of HAPCO Poles and Brackets complements "Live Better Electrically" program

By day, the spacious parking area at Tampa Electric Company accommodates office employees and visitors. At night, mercury vapor lamps mounted on HAPCO Poles and Brackets light the way for customer meetings and demonstrations at the "Leisure House." Here, through scheduled demonstrations by trained Home Economists, supplemented by displays of the latest electrical appliances, lighting and air conditioning, Tampa residents truly learn how to "Live Better Electrically."

Although atmospheric corrosion is a major problem in coastal or industrial areas, long service life can be expected from the 24 HAPCO Poles and Brackets here, since both are made from corrosion resistant aluminum. After being "spun" from aluminum alloy, HAPCO Poles and Brackets undergo special heat treating for maximum structural strength. Aluminum's attractive silver grey finish requires no initial or maintenance painting, and lightness in weight means additional savings in transportation and erection costs.

In the complete HAPCO line of Standards and Brackets are designs for all types of outdoor lighting installations. For more information, write to Hubbard Aluminum Products Company, 6301 Butler Street, Pittsburgh 1, Pennsylvania.

LIVE BETTER ELECTRICALLY

Tampa Electric's new headquarters are located on Dale Mabry Highway, midway between the northern city limits and Gandy Boulevard. At night, this heavily travelled, seven mile section of U.S. Route 92 comes brilliantly alive with light from 259 mercury vapor luminaires mounted on 208 HAPCO 8-foot Brackets and 51 HAPCO 6-foot Brackets.

HUBBARD ALUMINUM PRODUCTS COMPANY
Division of Hubbard and Company
Pittsburgh 1, Pennsylvania

SOLVE

WIRING PROBLEMS IN HOT LOCATIONS WITH TRIANGLE AVA CABLE

Triangle AVA Cable is a practical answer for all types of wiring in hot locations, particularly if oil, grease and corrosive fumes are a hazard. The insulation consists of a uniform wall of high dielectric strength varnished cambric sandwiched between two walls of glass reinforced asbestos impregnated with a chemically inert flame retarding, moisture resisting compound. An outer covering of glass reinforced asbestos braid, saturated and finished with flame and moisture resistant compounds, is applied over all.

AVA Cable can be pulled in conduit or can be installed as open wiring. It is recommended for power and lighting wiring in boiler rooms, steam tunnels, steel mills, soaking pits and other high temperature surroundings.

TRIANGLE CONDUIT & CABLE CO., INC.
New Brunswick, New Jersey

Write for bulletin AVA-10 describing Triangle Asbestos Varnished Cambric insulated cables.

Buy Smart — Buy from Your Distributor

TRIANGLE
"It MUST Be Right!"

distribution and communication systems, have organized as a new section of the National Electrical Manufacturers Association, it is announced by Joseph F. Miller, NEMA managing director.

Organization of the new NEMA subdivision followed discontinuance of the former Line Hardware Institute.

Albert R. Waehner, director, product management, Line Material Industries, McGraw-Edison Co., has been elected chairman of the section, and E. R. McCoy, vice-president, Joslyn Manufacturing and Supply Company, vice-chairman.

The new section was formed to continue the earlier work of the former Institute. Existing LHI committees will carry on as NEMA Committees through 1957-58.

Dates Ahead

National Electrical Contractors Assn., Annual Convention, Cincinnati, Ohio, Nov. 13-16.

American Institute of Electrical Engineers, Sixth Annual Textile Applications Conference, North Carolina State College, Raleigh, Nov. 14-15, 1957.

Southeastern Electrical Wholesalers Assn., 8th Annual Industry Day Meeting, Biltmore Hotel, Atlanta, Ga., Jan. 29-31, 1958. M. L. Tice, Exec. Vice-Pres., P. O. Box 176, Ben Hill Station, Atlanta 11, Ga.

American Institute of Electrical Engineers, Winter General Meeting, Hotel Statler, New York, N. Y., Feb. 2-7, 1958.

Oklahoma Utilities Association, Annual Convention, Biltmore Hotel, Oklahoma City, March 27-28, 1958.

American Institute of Electrical Engineers, Southwest District Meeting, Tulsa, Okla., March 31-April 2, 1958.

American Institute of Electrical Engineers, Middle Eastern District Meeting, Washington, D. C., April 28-30, 1958.

American Institute of Electrical Engineers, East Central District Meeting, Huntington, W. Virginia, May 13-15, 1958.

IAEI Southern Section elects new officers

OFFICERS elected at the 29th Annual Meeting of the Southern Section, IAEI, held recently in Atlanta were L. W. S. Cosens Sr., presdent, Miami; C. B. Grauer, 1st vice-president, Jackson, Miss.; C. R. Kennedy, 2nd vice-president, Greensboro, North Carolina; A. M. Miller, secretary-treasurer, Richmond, Va.; R. E. Ward, assistant secretary, Nashville; and D. C. Nichols, chaplain, Raleigh.

R. E. Ward of Nashville, will serve as chairman of the executive committee with other committee members W. A. Cochran, Jr., Birmingham; R. A. Taylor, Fort Lauderdale; C. G. Butler, Decatur, Ga.; A. J. Bech, New Orleans, La.; N. H. Spindler, Gulfport, Miss.; W. H. Jamison, Charlotte, N. Carolina; L. A. Turnage, Hartsville, S. Carolina; Poter Lindsley, Jr., Dallas; E. L. Brindel, Roanoke; W. H. Foster, Houston.

IAEI executive council representatives include N. E. Cannady, Raleigh, member; R. E. Ward, Nashville, alternate; D. L. Johnson, Atlanta, member; L. W. S. Cosens, Sr., Miami, alternate; A. M. Miller, Richmond, ex-officio.

Oklahoma Utilities hold light and power meeting

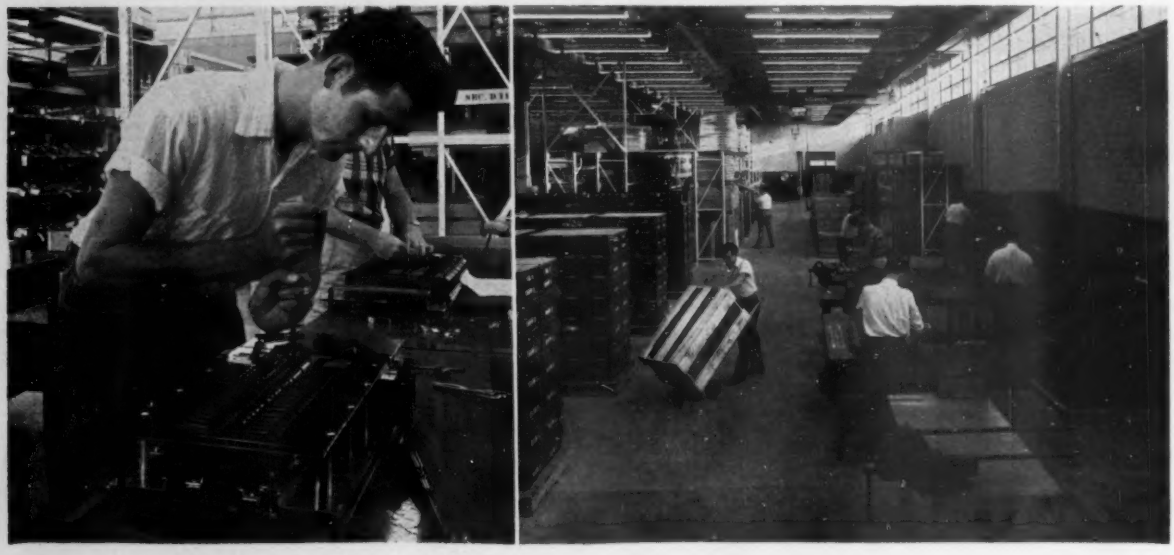
THE EASTERN and Western Districts of the Electric Light and Power Division, Oklahoma Utilities Association, held successive meetings recently in Bartlesville and Woodward, Okla., respectively.

Principal speakers at both meetings included Howard S. Cowan, Public Service Company of Oklahoma, Tulsa, who spoke on *Power, People and Publicity;* Harry W. Pitzer, Public Service Company of Oklahoma, Chickasha, whose topic was *Duplication of Facilities and Infringement of Territory by Rural Electric Cooperatives;* Otis Howard, Oklahoma Gas and Electric Co., Oklahoma City, who spoke on the subject *The Power Situation in Oklahoma;* and T. J. Farrahy, Jr., Westinghouse Electric Corp., Pittsburgh, Pa., who discussed *Modern Selling for Modern Load Building.*

Virginia utilities elect new association officers

JOHN C. PARROTT, president of Roanoke Gas Co., was elected president of the Public Utilities Association of the Virginias at the group's 39th Annual Meeting held

BUY
ALL TRIANGLE PRODUCTS LOCALLY FROM YOUR ELECTRICAL DISTRIBUTOR
It's smart today to buy all your electrical needs — wire, conduit, cable, switches, fittings — from your nearby distributor. One call shopping saves you time and money.
Your distributor's warehousing saves you countless cubic feet of valuable floor space, and assures you of a constant flow of fresh materials as your schedules demand.
Your distributor gives you
Fast delivery . . . on one item or a hundred— from one manufacturer, or from many.
Simplified bookkeeping . . . one invoice, one statement, one account.
Low inventory cost . . . his stock is your inventory control, gives you working capital.
Lower insurance rates . . . less inventory means your flood, fire rates are lessened.
That's why dependable electrical manufacturers advise you to always buy from YOUR DISTRIBUTOR — THE BEST FRIEND YOUR BUSINESS CAN HAVE! He's the one source for everything electrical — and he's local.
Your Distributor— The Best Friend Your Business Can Have!
TRIANGLE CONDUIT & CABLE CO., INC
New Brunswick, N. J.
TRIANGLE
"It MUST Be Right!"



Square D completes Atlanta plant

SQUARE D's newly completed assembly plant at 1401 Marietta Blvd., NW in Atlanta, will also serve as headquarters for regional sales operations. In excess of 30,000 square feet of floor space, the new plant is located to supply the company's electrical distribution and control products to the Southeast.

Expansion of customer service and engineering along with standard product stores is made possible by the Atlanta plant, a special feature of which is the addition of a complete job shop and customer assembly facilities shown at right. Circuit breaker assembly area is shown at left.

Directing operations are Steve Kovach as manager and S. T. Walz as southeastern sales manager.

recently in White Sulphur Springs, West Va.

Mr. Parrott succeeds William J. Stewart, of Wheeling Electric Co., as head of the organization of electric and gas utility companies serving Virginia and West Virginia.

Hugh D. Stillman, division manager, Appalachian Electric Power Co., Huntington, W. Va., was elected first vice-president. H. Atwood Hitch, vice-president, Virginia Electric and Power Co., Richmond, Va., was named second vice-president of the utility group.

Officers re-elected, all from Roanoke, Va., were William F. Keehne, system office manager, Appalachian Electric Power Co., as treasurer; Arthur T. Ellett, secretary-treasurer, Roanoke Gas Co., as assistant treasurer; and Robert W. McKinnon, executive secretary.

Manufacturers appoint new representatives

THE CORNISH WIRE Company recently named J. Noble Arnold II as sales agent for their products line in Georgia, Alabama and Florida. The Cornish firm maintains warehouses in Atlanta.

* * *

BRIDGEPORT FITTINGS, Inc., has announced that it will now be represented in Louisiana and Mississippi, Mobile, Ala., and Pensacola, Fla., by Cary Chapman and Co. The Chapman concern maintains offices at 213 South Front St., in New Orleans.

* * *

CURTIS LIGHTING, Inc., recently appointed as sales representative, Dupont-Wachter and Company, of 609 Tchoupitoulas St., New Orleans 12, La.

* * *

RUBY-PHILITE CORP., Long Island City, N. Y., has appointed W. C. Evans and Associates, of Fort Lauderdale, Fla., as their sales representatives for all of Florida with the exception of the western peninsula.

* * *

THE FISHER-PIERCE Company has named the L. R. Ward Company, of Houston and Dallas, as representative for photoelectric lighting control sales in Oklahoma and the Amarillo and Panhandle sections of Texas.

* * *

ALLIS-CHALMERS Manufacturing Company recently appointed the Cabell Electric Co., 424 South Parish St., Jackson, Miss., to distribute their line of distribution and instrument transformers in all of Mississippi except that part of the state north of Columbus and Oxford. They will also serve as an agency for the Allis-Chalmers feeder voltage regulators and power transformers.

* * *

DIEHL MANUFACTURING Company has selected the William E. Brice Co., 303 Bastrop St., Houston, Texas, to serve as a southern sales agent. The Brice Company will handle Diehl's full line of motors and fans in Texas and Oklahoma and its motors in Arkansas and Louisiana.

* * *

KUHLMAN ELECTRIC Company recently named Jay G. Gates to represent their complete line of utility and industrial transformers in Southwestern Ohio and Kentucky. Mr. Gates will maintain offices at 2430 Central Parkway, Cincinnati, Ohio.

* * *

LUMINOUS CEILINGS, Inc., Chicago, Ill., recently announced the appointment of five new sales representatives in the Southern area.

They are W. J. "Red" Childers, Dallas, Texas; R. A. "Bob" Putterman, Houston, Texas; William "Bill" Frank, New Orleans, La.; and John G. "Johnny" Gaines and John G. "Jack" Gaines, Jr., Gaines Co., Kansas City, Mo.

FAEC convenes in St. Petersburg

THE FLORIDA Association of Electrical Contractors met at the Soreno Hotel, in St. Petersburg, recently for their Annual Convention and Fifth Electrical Trade Show. FAEC President James Dandelake presided at all business and educational sessions.

Principal speakers on the first day of the meeting were W. J. Clapp, Florida Power Corp., St. Petersburg, who spoke on the convention theme *Forward: Electrical Florida;* and Howard L. Palmer, Palmer Electric Co., Orlando, who discussed *Sales and Service Profits in 1958.*

The second day's session was highlighted by panel presentations led by C. Wesley Olson, Jr., of Daytona Beach, on the subject *Estimating for Profit:* and Granville Alley, Stetson University, on *Labor-Management Relations.*

On the third day Vernon C. Holloway, Interstate Electric Co., Miami, talked on *Electric Codes and Their Values:* and John A. Gidley, St. Petersburg Fire Marshall discussed *Re-Wiring Public Buildings for Public Safety.* A Contractor-Distributor-Manufacturer Forum was moderated by Vincent L. Burkhardt, Arrow Electric Co., West Palm Beach; and a panel and visual presentation, Safety on the Job, was made by A. P. McIntosh, State Department of Industrial Safety, Tallahassee.

The business session held on the final day of the conventions was followed that evening by the installation of officers for the coming year and the annual FAEC banquet.

Home Improvement Council 1958 campaign

THE 1958 PROGRAM for the Home Improvement Council was previewed recently in New York City for industry magazine editors by Council Chairman Fred C. Hecht.

Although HIC is an outgrowth of ohi, it is drastically different in both structure and objectives. The council has been organized on a permanent basis so that tie-in efforts can be given the long-range planning needed for real effectiveness.

The program will be consumer-directed and designed to trigger the homeowner into action. Support will come from memberships at all levels of the industry, with direct benefits for each member, no matter how small his business.

Target date for launching the new concept in industry promotion is January 1, when HIC will announce a $250,000 contest for the nation's homeowners. Backed by heavy promotion, the contest promises to arouse the homeowner's interest in improvement, convince him of its benefits and move him to act.

The contest will be in two phases — with big cash awards for winners in each. The first phase, intended to get the homeowner thinking about home improvement, will require him to check-list the adequacy of everything in, on and around his home. He will also be asked to write 25 words about his "number one" home improvement need. Several hundred thousand entries are expected in this phase. HIC officials predict that the result — if every participant really exploits the contest — can be staggering.

Every entrant in the first phase will get a mailing from HIC thanking him for entering and urging him to participate in the second phase, which will require actual performance of a modernization project involving a local HIC member. The HIC membership seal will be used conspicuously to attract consumers to the stores and offices of local members. Dealers, contractors, lenders and others at the local level will be "contest headquarters" for homeowners who have been pre-sold at the national level.

Georgia IAEI elects officers

C. R. MINORS, commercial sales engineer at the Atlanta division of Georgia Power Company was elected secretary-treasurer at a recent meeting of the Georgia Chapter, IAEI.

Leon Roberts of Valdosta, was elected chairman and R. J. Edenfield of Augusta was elected vice-chairman.

Chairman of the executive committee will be H. H. Buckalew; other committee members are H. A. Mason, R. M. Ballard, Charles T. James and R. Lester Gruver.

Slow fan selling season results in overstock

ELECTRICAL DISTRIBUTORS in many sections of the country are faced with a serious overstock of household type fans. An inventory of more than $1 million was reported by 127 distributors for the second successive year in a special survey conducted by the fan and ventilating committee of the National Association of Electrical Distributors. The slow fan selling season was attributed to generally cool weather throughout most of the nation during the summer months.

The results of the special survey were among the topics under discussion at a recent meeting of the fan and ventilating committee. The meeting was held in NAED New York City headquarters. Chairman of the committee is Charles O. Stoike, Revere Electric Supply Co.

The survey, considered to be representative of an industry trend, indicated that the national household type fan inventory was just as serious this year as it was at the close of the 1956 fan selling season. The Midwest and the South, with sales ranging from poor to fair, were particularly affected. A possible exception was the Northeastern section of the country.

Total dollar volume (distributor's cost) of the units on hand — as of August 31 — was $1,023,-692. This compared with $1.198,-783 for 1956. The survey did not include kitchen fans, bathroom fans or exhaust fans.

Fan sales this past summer were thought to have been far below sales in 1956 because many distributors started the 1957 season with large heldover stocks. Many wholesalers also were more conservative in placing pre-season orders as well as orders during the season.

Some distributors have indicated they will not purchase fans for next season until they move present stocks. Others advise they will use greater discretion in pre-season orders, as well as when considering large orders during the season. Still others are reducing the number of lines they stock.

More importantly, the NAED committee noted, most individual full functioning electrical distributors have come to realize the need for establishing a closer liasion with the manufacturers. Fans, unlike any other commodity which he stocks and sells from his warehouse, represent an item in which there is great capital involved for the electrical distributor.

Such liasion undoubtedly would make for a better understanding towards solving mutual problems since manufacturers, too, are confronted with a risk each year when they plan production schedules.

It was brought out that room air conditioners have affected sales of household type fans to some extent. In the opinion of the NAED committee, however, they were not believed to drastically affect the sales of fans, at least not to the point where such type fans will become obsolete. It was pointed out, though, that room air conditioners and the introduction of new fan types have effected the sales of hassock, desk and bracket fans.

News about people

Sam B. Frank **Lincoln Wagner** **John T. Finley**

James R. Kearney, Jr., president of the **James R. Kearney Corp.**, has announced the recent elevation of three company executives to vice-president. The new appointments, affect the sales, engineering and financial divisions of the corporation.

Sam B. Frank was elected vice-president and assistant sales manager. Mr. Frank joined the company in 1945 following 10 years experience in the operating and engineering departments of a power company. A graduate of Washington University, his first duties with the company were in advertising as a technical copywriter. In 1946 he became a direct engineering representative in the Southeast part of the country with headquarters at Atlanta, Georgia.

John T. Finley was elected vice-president and chief engineer. Mr. Finley joined the engineering department of the company upon graduation from Washington University. After 11 years in both product design and testing he was promoted to assistant chief engineer. He later became chief engineer.

Lincoln Wagner was elected vice-president and assistant treasurer. Mr. Wagner, who is a graduate of the St. Louis University School of Commerce, joined the company in 1934. Assigned duties as a cost accountant, he became chief cost accountant in 1947. He was later promoted to chief accountant responsible for all activities of the department. In 1956 he became assistant treasurer of the corporation.

John R. Bartizal, who has served as chairman of the board of **Benjamin Electric Manufacturing Co.,** of Des Plains, Ill., for the past two years, announced that at a recent meeting of the board of directors certain changes in top level officers were made.

The resignation of **Hoyt P. Steele,** who served as president for the past three years, was accepted and the directors elected Mr. Bartizal president of the company. He will also continue as chairman of the board. Mr. Steele will continue as a director of the company.

Other actions of the board resulted in the election of **J. H. Fall, III** as vice-president and treasurer. **George A. Hamm** was elected vice-president and will continue as secretary.

BullDog Electric Products Company has announced the appointment of **Lloyd G. Driy** as field engineer to its St. Louis District office. Mr. Driy attended Washington University and was formerly associated with the Emerson Electric Co.

Osgood & Associates, Inc., manufacturers representatives, has announced the addition of **Earl S. Guild** to its staff of sales engineers. Mr. Guild was previously connected with Fulwiler and Chapman.

John C. Kerin, assistant manager for the Western Division of **Oklahoma Gas and Electric Company** passed away recently shortly after suffering a heart attack.

Mr. Kerin joined OG&E in 1927 as a work order clerk and held positions with the company as accountant, district manager, service manager, and assistant division manager.

NEW EDITION
JUST OFF THE PRESS

ELECTRICAL ESTIMATING GUIDE

Covers Over 2000 Wiring Jobs

This new, entirely different estimating guide has 175 completely worked out charts.

Authentic, Time Saving—Easy to Use

This book is easy to use—it has no complicated mathematics or formulas to work over. You merely determine the nature of the wiring, check it in the BLUE BOOK OF ELECTRICAL ESTIMATING and there's your answer—it's the simplest estimating book ever written.

FREE NATIONAL ELECTRIC CODE BOOK

Just For Examining Blue Book

This book was written by a successful electrical contractor and estimating engineer with over 20 years' experience. It has an entirely different method of determining estimates on wiring jobs. Electrical contractors, journeymen, architects, and engineers will find use for this book every day. Gives time required to do jobs along with complete labor charges in every state in the country. Order this book now at special introductory price of $7.75. As a special offer to Electrical South readers the publishers give a free copy of the latest National Electrical Code Book just for examining the 1956 Blue Book of Electrical Estimating.

ESTIMATING HANDBOOKS ASSOCIATES — DE KALB, ILL.

Send me the NEW BLUE BOOK OF ELECTRICAL ESTIMATING and the latest edition of the National Electrical Code Book for 5 days free trial. I understand I may return the book within 5 days and owe nothing. If I keep it I will pay $7.75 plus postage for shipping. I keep the Code Book FREE even if I return the Blue Book of Electrical Estimating.

NAME

ADDRESS

TOWN ZONE STATE

☐ I enclose $7.75 to save shipping cost.
☐ Send C.O.D. I'll pay postman $7.75 plus C.O.D. fee on delivery.

(November 1957)

Walter R. Stone, formerly chief electrical inspector of the City of Fort Worth, Texas, has resigned that position and is now assistant chief electrical inspector of New York City for the **New York Board of Fire Underwriters.**

Mr. Stone was appointed electrical inspector for the City of Fort Worth in 1947. Two years later he was promoted to chief inspector in which capacity he served until his recent resignation.

Mr. Stone helped organize and served as the first chairman of the North Central Division of the Texas

Walter R. Stone

Chapter, AIEI. He has more than twenty years of electrical experience and holds a master electrician's license as well as a marine engineer's license.

During World War II Mr. Stone served the U. S. Maritime Commission as lieutenant. He has studied at Columbia University and TCU.

The appointment of **Stephen A. Kachuba** as district sales manager for the state of Florida was recently announced by **F. A. Ballman,** vice-president of sales for the **Thermador Electrical Manufacturing Co.**

Mr. Kachuba will cover both the architectural and building fields as well as service distributors for all Thermador and L & H products in Florida from headquarters in Lake Worth.

John B. Munson has been named sales manager of wiring devices for the **Bryant Electric Co.,** subsidiary of Westinghouse Electric Corp. Mr. Munson replaces Clyde W. Foster who has been transferred to Chicago as manager of the midwestern region.

Mr. Munson is an engineering graduate of the University of Wisconsin and received a master's degree from the Harvard Graduate School of Business Administration. He was formerly associated with the Louis Allis Co. and the Allen-Bradley Co.

ANNOUNCING
A COMPLETE NEW LINE

IT PAYS TO HAVE HUBBELL GOOD CONNECTIONS

Twist-Lock®
approved for GROUNDING purposes only!

A COMPLETE NEW LINE . . . NON-INTERCHANGEABLE with REGULAR "TWIST-LOCK" UNITS

GREEN HEXAGONAL GROUNDING SCREW.

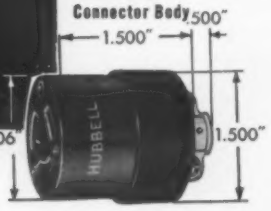
ALL UNITS IN DISTINCTIVE BROWN COLOR.

4700
3-wire, 125 volt

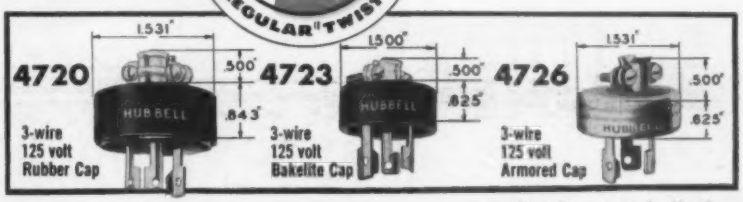
3-WIRE,
15 AMP., 125 VOLT

FOR APPLICATIONS that require POSITIVE GROUNDING plus POSITIVE LOCKING.

3-wire, 125 volt
4730
Connector Body



Elbow-shaped grounding slot prevents insertion of regular "Twist-Lock" caps. Accepts 4700 Series Caps only.



write for new bulletin.

FIRST . . . and still the FINEST!

HARVEY HUBBELL, INC.
HIGHEST QUALITY
WIRING DEVICES • MACHINE SCREWS

DEPT. R-2 BRIDGEPORT 2, CONNECTICUT

WIRING DEVICE WAREHOUSE LOCATIONS
Scarborough, Ontario, Can. 1160 Birchmount Road
Bridgeport 2, Connecticut State and Bostwick Streets
Chicago 7, Illinois 37 South Sangamon Street
Los Angeles 12, California 103 North Santa Fe Avenue
San Francisco, California 1675 Hudson Avenue
Dallas 7, Texas 1111 Dragon Street

ELECTRICAL SOUTH
806 Peachtree St., N.E.
Atlanta 8, Ga.

November, 1957

Gentlemen:

Please send me additional information on items mentioned in this issue of Electrical South. I have listed the key numbers of these items at right.

(Print Plainly)

Name ..... Title .....

Company .....

Address .....

City & State .....

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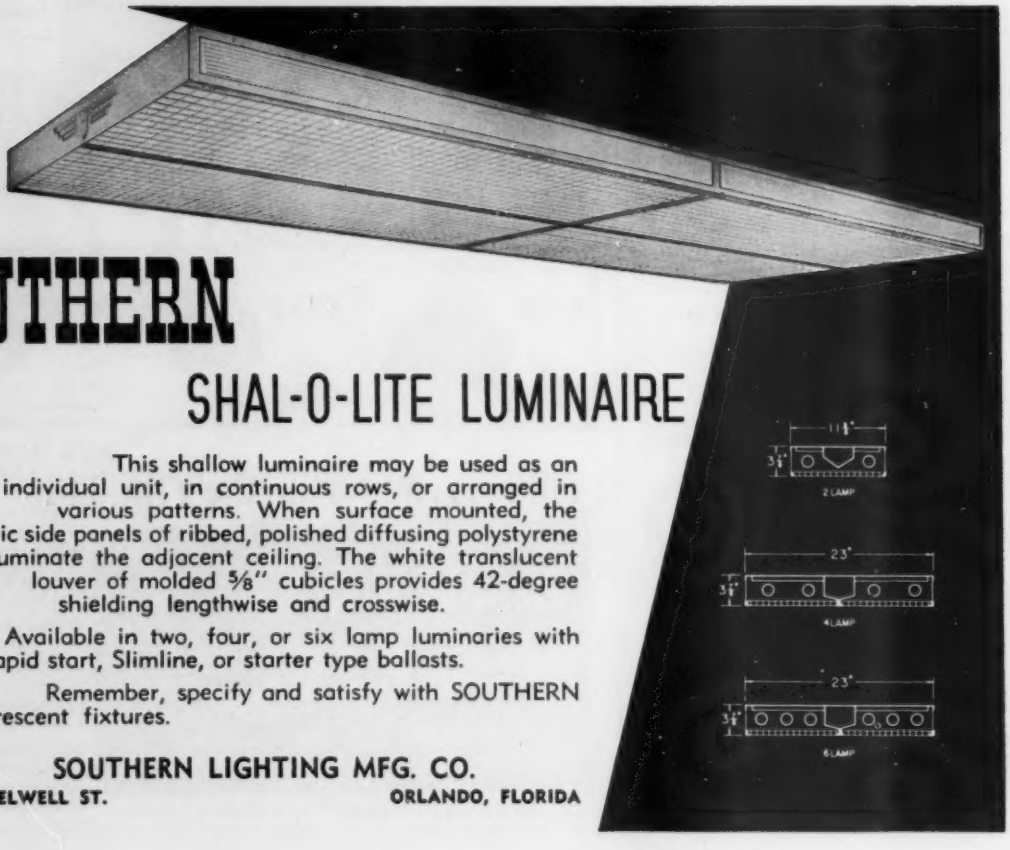
FOR MORE INFORMATION—Use this handy return coupon for requesting additional information on products listed or bulletins announced. Be sure to give your firm name and your position or title. You may request additional information on new utility products, pages 78 and 81; and new electrical products, pages 110-114. Write in item numbers in coupon space above.



SOUTHERN

SHAL-O-LITE LUMINAIRE

This shallow luminaire may be used as an individual unit, in continuous rows, or arranged in various patterns. When surface mounted, the plastic side panels of ribbed, polished diffusing polystyrene illuminate the adjacent ceiling. The white translucent louver of molded ⅝" cubicles provides 42-degree shielding lengthwise and crosswise.

Available in two, four, or six lamp luminaries with Rapid start, Slimline, or starter type ballasts.

Remember, specify and satisfy with SOUTHERN fluorescent fixtures.

SOUTHERN LIGHTING MFG. CO.
502 ELWELL ST. **ORLANDO, FLORIDA**

George F. Foley of the **Florida Power Corp.**, in St. Petersburg, has been elected vice-president, secretary and treasurer of the utility and a

George F. Foley

member of the board of directors. Mr. Foley succeeds **E. K. IlgenFritz,** who will continue to serve as a financial consultant.

Announcement has been made of the retirement of **Ray W. Becker** from the position of Southern Regional Manager for **Ideal Industries.**

Ray W. Becker

Knowles Parker, formerly district manager in Buffalo, will succeed Mr. Becker as Southern Regional Manager.

W. J. Berry, Southeastern District Manager of the Graybar Electric Co., has announced the appointment of **K. H. Coyner** as operating manager at Norfolk; **E. H. Helms,** operating manager at Asheville; and **F. D. Masten,** operating manager at Durham.

Elmer M. Richardson has joined **Olin Mathieson Chemical Corporation** as director of marketing for Olin Aluminum, Sam Gurley, Jr., vice-president of sales, Aluminum Division,

ANCHOR

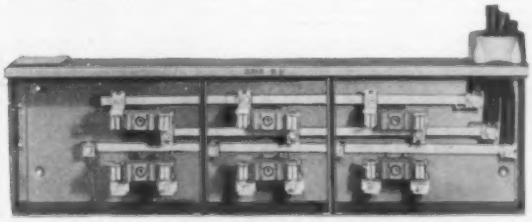
LARGER OUTDOOR HORIZONTAL METER TROUGHS

To supply 100 ampere service capacity to each dwelling unit in multiple family buildings Anchor offers new large outdoor horizontal troughs. Width, height, and depth are substantially increased over present industry standards with emphasis on added room at the ends where the cables enter the trough.

On the 3100-ME series, 4" is added to end of first and last meter positions and special line terminals are furnished with the bussed troughs which are interchangeable in the field to permit the entrance at left top or side and the right top or side. Hubs, or hub openings with sealed tamper-proof plates, for 2½" conduit can be located at these four positions

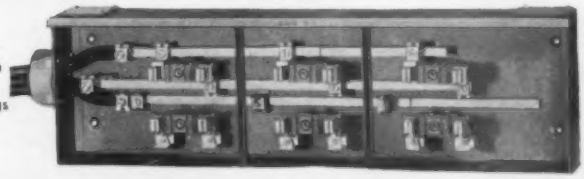
Line terminals are open top and will carry 4/0 cable in addition to adequate buss bars. Pressure foot terminals available.

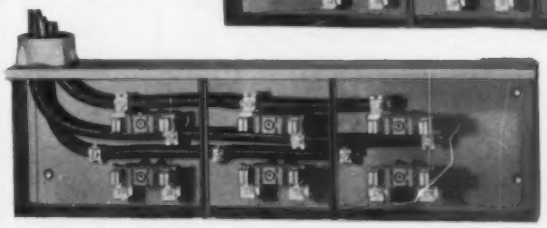
Troughs are made two to six gang, with or without busses and of galvanealed steel or aluminum



CAT No. 3373-ME
Bussed and wired with three 4/0 at right top.
Enclosed hub openings at left top and side

CAT No. 3373-ME
Bussed and wired with three 4/0 at left side.
Enclosed hub openings at left and right top



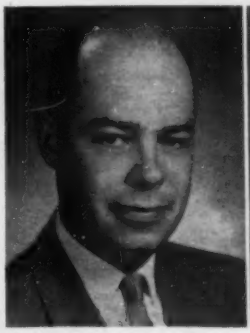


CAT No. 3173-ME
Wired with three 4/0 at left top
Enclosed hub opening at right top

Vertical channels for covers are removable for ease of wiring.

ANCHOR MANUFACTURING CO.
MANCHESTER, NEW HAMPSHIRE

announced recently. Mr. Richardson will have direct responsibility for the direction and coordination of marketing and administration activities and services.



Paul M. Heilman

A. R. Walthers

Emil Nichols

The following appointments have been announced by W. H. Steinkamp, vice-president in charge of sales of the **Weston Electrical Instrument Corp.**

Emil Nichols becomes manager of test equipment sales. A graduate of Newark College of Engineering, Mr. Nichols was formerly associated with Allen B. Du Mont Laboratories. A lieutenant in the United States Navy during World War II, he was an instructor in Radar Maintenance at Harvard University and Pearl Harbor.

A. R. Walthers was appointed manager tachometer sales. A graduate of Purdue University, Mr. Walthers has recently sold for Weston in the Cleveland territory. He served with the Navy Air Corps as electronic specialist.

Paul M. Heilman was named distributor sales manager. A graduate of M.I.T., Mr. Heilman was formerly associated with Reliance Electric and Engineering Company and General Electric. A United States Navy lieutenant during World War II, he commanded an LCI and took part in two invasions.

A. E. Swedenborg has been elected vice-president in charge of sales at the **Benjamin Electric Manufacturing Company.**

His appointment follows a long career with the company. Starting in the purchasing company in the twenties, he did stints in their production methods, service departments and sales. Progressively Mr. Swedenborg became Central Division sales manager, assistant general sales manager, and general sales manager.

Two new sales representatives have also been appointed by Benjamin Electric to serve areas in the South.

Malcolm L. Mimms was named district representative for Arkansas, Tennessee, Mississippi and Kentucky.

Mr. Mimms is a graduate of Hume Fogg Technical and has worked with various electrical wholesalers. His

A. E. Swedenborg

past dealings with commercial and industrial lighting equipment has given him a thorough knowledge of the complete Benjamin line. Mr. Mimms will operate from 754 Richfield Dr., Nashville, Tenn.

John L. Hernandez becomes district representative for Southern Louisiana, Mississippi, Alabama and Northwestern Florida.

Mr. Hernandez was formerly employed at Jewel Electric Products, Inc. His educational background and past employment form an exceptional background for handling the commercial, industrial and outdoor lighting lines, of the Benjamin Co. Mr. Hernandez will operate from 4130 General Pershing Street, New Orleans 25, La.

Russell W. Crick has been named field engineer for **Line Material Industries.** He will work with F. J. Williams in sales in Western North Carolina and Northwestern South Carolina with offices in Charlotte.

PREFERRED BY MEN WHO KNOW QUALITY

ALWAYS INSIST ON

AMERICAN *Bonded* ARMORED CABLE

American Bonded Armored Cable is the preferred cable — by far — for many retsons. It's tougher, more durable, longer-lasting. Its flexibility and smoother-finish make it easier to handle — cutting installation time and costs — ample reason for insisting on American Bonded.

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Technical books

Linear feedbacks

"Analytical Design of Linear Feedback Controls," by George C. Newton, Jr., Leonard A. Gould, and James F. Kaiser. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., 419 pages, 169 illustrations, $12.00.

The analytical design theory described in this new work is in distinct contrast to the methods described in most introductory books on the subject of feedback control. By "analytical design," the authors mean the design of control systems by application of the methods of mathematical analysis to idealized models which represent physical equipment.

In the analytical design procedure described here, the starting point is the system specifications. These include descriptions of the input, the disturbances, and the desired response.

Also included is a statement of the basis on which the system performance will be judged; this statement is in the form of a performance index. The design objective is to minimize (or maximize) the chosen performance index.

Electronics

"Engineering Electronics," by John D. Ryder. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y., 666 pages, $9.50.

This comprehensive publication provides a broad, fundamental coverage of the non-radio areas of electronics, particularly those areas of interest in instrumentation, computation, and general industrial usage. It includes the electronic fundamentals and operating principles important to computers, industrial control, and servomechanisms without becoming an instruction book in the operation or maintenance of any particular piece of apparatus.

Suitable for senior college level or for use by those already practicising in industry, it provides enough elementary electronics to enable those lacking preliminary preparation to utilize the material. Illustrative, worked exercises and problems for solution are included.

Emphasis is on underlying principles and basic circuits applicable to various electronic devices and equipment. Treatment is quantitative, rather than descriptive or qualitative. Mathematics and circuit analysis are used to

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NAIL ANCHOR
For All Masonry
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DRILL HOLE
Same diameter as anchor. Depth should be length of anchor less thickness of fixture.
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Through fixture and tap it into masonry flush against the fixture.
PLACE NAIL
Into anchor and hammer nail until fully inserted.
The fully inserted nail will expand the anchor and fasten the fixture firmly and neatly to the masonry.
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give a fundamental understanding of the material.

Recent advances in semi-conductors and transistors are included; particularly a rather fundamental development of the transistor equivalent circuit from four-terminal network theory.

Unusually broad coverage: in particular, Chapters 8 and 9 cover the fundamentals of electronic computation, both by analog and digital methods, as well as fundamental circuits applicable to both forms of computation. Material on frequency response of amplifiers is from both the sinusoidal and pulse standpoints.

Transformers

"Medium Size Transformers," by Samuel Heller. Published by the Datarule Publishing Co., P. O. Box 69, Scarsdale, N. Y., 208 pages, illustrated, $25.00.

This book is devoted exclusively to step-by-step instructions for designing, reconnecting and testing virtually all types of universally used transformers rated at 100 kva or less. There is a separate chapter devoted to the design and construction of potential and current transformers and saturable core reactors. It completely eliminates the need for computations through the use of specially designed charts which are incorporated as part of the spiral bound book.

As the author says, "The purpose of this book is to give complete information — information not available elsewhere — that can be put to use without wondering where to start, or whether the result will work." With this book, it is a simple matter to design a power transformer from scratch . . a new winding from an existing core . . . and convert an ordinary small transformer into an autotransformer many times larger.

It is also a simple matter to tap windings for different purposes . . . design a starting compensator or a DC balance core for a 3-phase winding. The author has reduced to the simplest terms such information as what turns to wind, what size wire to use, how large the core should be. All this is contained in the 208 pages of text which includes 47 full-page charts and 112 easy-to-understand diagrams.

"Medium Size Transformers" is authored by Samuel Heller, chief engineer for both Consolidated Electric Motor Company and American Rectifier Corporation, who based this book on 25 years of laboratory research as well as actual designing and re-winding of more than 300 types of transformers. The book carries an unique, unconditional guarantee; i.e., if the user cannot do any of the things the author claims can be done, the purchase price will be refunded.

Protective lighting

"American Standard Practice for Protective Lighting." Published by the Illuminating Engineering Society, 1860 Broadway, New York 23, N. Y., 50¢.

Anyone responsible for industrial plant protection or for recommending and installing industrial lighting should be familiar with the principles and recommendations set forth in this new publication of IES.

Designed to assist plant officials responsible for guarding against trespassing, theft and sabotage, this report treats of protective plant lighting as separate from lighting for industrial production and provides descriptive and application data for a wide variety of outdoor lighting equipment, including types of light sources; gives lighting specifications and recommendations for specific areas; covers circuiting; and illustrates with drawings, diagrams and charts numerous protective lighting problems.

Wiring manual

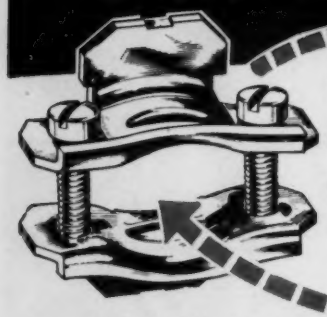
"Wiring Manual for Home and Farm," by A. Carl Bredahl. Published by McGraw-Hill Book Co., Inc., 327 West 41st St., New York 36, N. Y., 236 pages, illustrated, $4.95.

How to do an expert job of planning safe, reliable wiring systems to carry the heavier power loads of modern homes and farms is fully explained in this newly-published manual. It gives easy-to-follow directions for analyzing electrical requirements and for laying out wiring which insures efficient, economical service.

This practical book supplies simple methods for determining the power loads of today's electrical equipment, appliances, and lighting . . . details step-by-step procedures for planning and sizing each phase of the wiring system.

It shows, for example, how to determine service entrance feeder size . . . proper number and size of branch circuits . . . adequate overload protection . . . the right

TOMIC Cable Connectors



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. . . and Tomic Cable Connectors are as easy to install as they are versatile! They're installed from the outside or inside of the box—no locknuts to lose or fumble with—do the job easier, quicker, better. And Tomic's No. 100 is fast becoming America's most popular Cord Connector.

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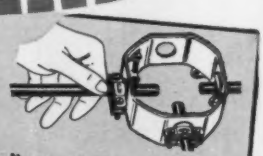

SIMPLE – slips in from outside.
QUICK – installed in 10 seconds.
CONVENIENT – for securing contacts.
DEPENDABLE – can not shake loose.

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Originators and Manufacturers of Famous TAP-ON Fittings
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number and types of outlets . . . and other essentials of sound wiring.

Wiring Manual for Home and Farm sets up three degrees of electrification in the home (or three different "sizes" of systems) and shows practical examples of types of wiring needed for each. Thus it provides a helpful starting point for planning virtually any kind of wiring job.

In addition, this down-to-earth manual covers the many new usages of electricity on the farm. Included are procedures for planning the all-important systems of "outside electrical distribution."

Tables and other useful reference material help the reader easily determine such information as the required number of electrical circuits and their sizes, based on the floor area of a house and major electrical equipment to be used.

Electron devices

"Fundamentals of Electron Devices," by Karl R. Spangenberg, Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y., 505 pages, $10.00.

Covering electron devices from atomic theory to circuit applications, this book gives a unified, fundamental treatment of electron devices, including vacuum tubes and transistors. It is useful to practicing engineers who want up-to-date information on new devices, particularly semiconductor devices. The similar features of tubes and transistors is emphasized through the common denominator of semiconductor theory.

Principal emphasis is placed upon the internal physics of devices and the role this plays in determining the external characteristics. A fundamental treatment of the commonest circuit applications also is included, this comprising about 40% of the book, while 60% is devoted to the devices themselves.

The author uses a new approach in the detailed treatment of energy levels in semiconductors and the influence of these on junction effects, emission, and photoeffects. Other unusual features are: emphasis on the analogous features of vacuum tubes and transistors . . . latest forms of transistors and photoconductive and photovoltaic cells . . . numerous figures throughout . . . fairly complete treatment of critical materials . . . eleven appendixes giving origin of basic relations and tabulating important facts . . . bibliography of more than 200 references . . . numerous problems.

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ELECTRICAL MANUFACTURERS and their SOUTHERN and SOUTHWESTERN REPRESENTATIVES

1958 EDITION

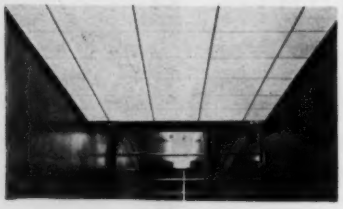
Coming in December, 1957

New products

Luminous ceiling material reduces surface brightness

THE STA-BRITE Fluorescent Manufacturing Co., 3550 N. W. 49th St., Miami, Fla., has announced a new type of luminous ceiling material, which offers many advantages to the architect, contractor and owner.

The unique bi-planar construction of the "Paragrid-Tile," suspended in slim "U-Trax" rails does not only



render a delightful pattern but also produces an amazing light diffusion.

"Paragrid" diffuses and distributes the light uniformly over a wide area so that surface brightness is reduced to a minimum.

The "Paragrid-Tile" illuminated ceiling is definitely from 25 per cent to 30 per cent more efficient than an equivalent opaque metalgrid ceiling and compares favorably with Wilson's other ceiling product "Luve-Tile."

The 95 per cent plus "put-through" and the 40° x 40° cut-off produce more efficient light transmission at lower costs.

For additional data, ask for item P-1110, using the coupon on page 104.

Precise 90 degree bends for electrical tubing

PRECISE BENDING of electrical tubing by means of a straight lateral blue line on each length is possible with the Bend-Aliner EMT, manufactured by the Steelduct Co., Republic Steel Bldg., Youngstown, Ohio.

Ninety by ninety bends are made by first lining up the blue Bend-Aliner line with a 90 degree centerline scored into the face of the bender, and making the first bend (A). The second bend is made with the blue line matched with the center of the forearm or hook of the bender (B).

To keep offsets in the same plane, the wireman makes the first bend with the blue line matched to the center of the bender's forearm (C). He shifts the tubing 180 degrees and makes the second bend with the line matched to the center of the bender hook (D).

For additional data, ask for item P-1111, using the coupon on page 104.

Circuit breaker enclosure permits close mounting

A COMPLETELY new line of explosion-proof, dust-tight, and weather-resistant circuit breaker Pylets has been introduced by the Pyle-National Co., 1334 Kostner Ave., Chicago 51, Ill.

Enclosures are available for breaker frame sizes from 100 amp., 250 volts a-c maximum to 225 amp., 600 volts a-c maximum. Of the air-break

type, they are suitable for use in Class I, Group D (NEMA type VII); Class II, Groups E, F and G; and Class III (NEMA types IX, V, III) hazardous locations.

The compact, rectangular shape of the enclosure permits mounting adjacent units on extremely close vertical and horizontal mounting centers.

For additional data, ask for item P-1112, using the coupon on page 104.

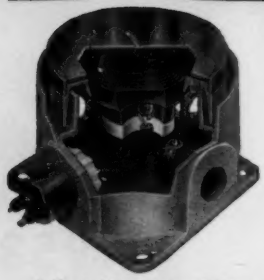
Duplex flush receptacles with double contacts

TO ROUND OUT its duplex flush receptacle line Eagle Elec. Mfg. Co., Inc., 23-10 Bridge Plaza So., Long Island City, N. Y., now offers two new heavy duty receptacles which feature an exclusive double-wipe contact.

Eagle exclusive double wipe contacts hug tighter and assures a much larger contact area on both sides of the prong. These contacts are practically indestructible and will last a lifetime. In addition, sturdier bakelite with heavy duty metal strap and

Latrobe PRODUCTS

FLOOR BOXES • WIRING SPECIALTIES



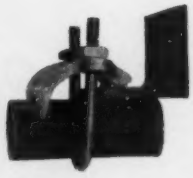
Adjustable Watertight Floor Boxes

All adjustable boxes are now equipped with a positive bond which makes them completely fire-proof.

"Latrobe" Floor Boxes and Wiring Specialties are designed to do their job easily and surely with no excess parts. This same compactness of design makes for fast, easy installation.

"Latrobe" Pipe or Conduit Clamp

This clamp is made with a double safety bite of case hardened tool steel. Two models—Right Angle and the Parallel support. Each model comes in 10 sizes to handle pipe or conduit ½" thru 4".



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parts are incorporated to better handle the increased demands of modern wiring.

Shallower construction allows additional room for surplus wire and joints, and ⅞" long mounting screws are attached to strap. These new heavy duty duplex flush receptacles are available in 2 models: with plaster ears, (No. 978) and without plaster ears (No. 977). Both units are individually boxed and are available in brown and ivory bakelite.

For additional data, ask for item P-1113, using the coupon on page 104.

Fluorescent fixtures for extra illumination

INTRODUCTION of two outstanding fluorescent fixtures, the Power-Lume F and the Power-Lume V, designed to utilize fully the extra illuminating power of the Power Groove lamp has been announced by Wheeler Reflector Co., 275 Congress St., Boston 10, Mass.

The Power-Lume F fixture is first choice for use where rough work is being performed and shielding is unimportant. Where reduced brightness is required, the same fixture with aluminum reflector is the recommended choice.

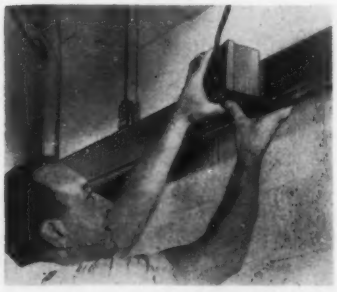
For additional data, ask for item P-1114, using the coupon on page 104.

100 ampere busway designed for feeder or plug-in system

A 100-AMPERE plug-in busway, designed for use where plug-in outlets over a wide area are necessary, is available from the General Electric Co., Plainville, Conn.

The new busway, known as Type DH, can be hung on ten-foot centers in the edgewise position. It is suited for industrial plants, commercial buildings, manual training shops, and laboratories.

Type DH is used as a plug-in system and as a feeder for lighting systems and as a feeder or branch cir-



cuit from a switchboard or other power-consuming device. When a 100-ampere or less receptacle is required to feed a portable welder or similar machine, Type DH can be installed vertically between the flanges of a steel column or against a wall.

For additional data, ask for item P-1115, using the coupon on page 104.

Service entrance fittings for low-roof type buildings

KNOX Porcelain Corp., P. O. Box 2031, Knoxville, Tenn., offers a complete line of service entrance heads, masts and accessories for low roof-type buildings.

Neat one-piece construction of their slip-fitter service entrance heads eliminates extra clamping parts. Their revolutionary all neoprene synroflashing eliminates mast vibration and roof leakages at the point of penetration and is available for 2 and 2½ inch pipe.

Accessories include offset adapters, pull-off fittings, pipe riser clamps, pipe mounting wireholders and pipe mounting brackets.

For additional data, ask for item P-1116, using the coupon on page 104.

Monofin baseboard design features high wattage

FEATURING advanced design, the Monofin baseboard couples high wattage, (250 watts per foot) uniformly low surface temperatures and cool back, for maximum economy. Exclusive Monofin element is encased in rigid aluminized steel and fiberglass insulated for greater safety and noiseless operation. A low-mass element, it responds instantly to the thermostat. Monofin baseboard is manufactured by Wesix Electric Heater Co., 390 First St., San Francisco, Calif.

Heating sections are 32" and 48" long. Accessories are: Control section with combined thermostat and two-pole switch, duplex receptacle, moulded end pieces, corner section, hood and 240 volt supply section for room air-conditioner.

For additional data, ask for item P-1117, using the coupon on page 104.

Dry type transformer line extended to lower rating

TWO LINES of dry-type distribution transformers (Types DS-3 and DT-3) manufactured by Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa., have been extended to include lower ratings with decreased weight and size.

The three-phase DT-3 model is now available in a 30-kva rating, extending the line to ratings from 30 to 300 kva in either 600- or 2400-volt class. The new model is 22 per cent smaller than the previous similarly rated design, and 20 per cent lighter.

The single-phase DS-3 model line now includes a low rating of 15 kva, making the range of ratings from 15 to 167 kva in the 600- and 5000-volt classes. This new model is 15 per cent smaller and 20 per cent lighter than the previous design of smaller rating.

For additional data, ask for item P-1118, using the coupon on page 104.

29 of the 50 largest public utilities use

HOLAN®

bodies and power equipment

In the third annual edition of the FORTUNE Directory, the 50 largest U. S. public utilities are listed. Most of these companies became big by thinking big—they buy the best equipment in order to obtain the best results. We are proud to note that 29 of these top utilities are Holan customers.

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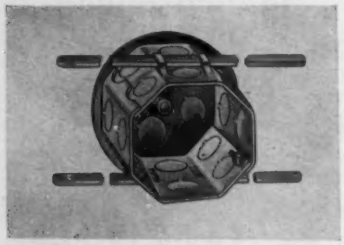
Improved hung ceiling box utilizes sixteen knockouts

THE NEWLY improved hung ceiling box manufactured by Arrow Conduit and Fittings Corp., 129-30th St., Brooklyn 32, N. Y., cuts costly pipe bending to a minimum.

The Arrow hung ceiling box has four extruded slots which hold two supporting bars, mounted on edge, in parallel position. With bars resting on



channels, the box has a four-point suspension—which gives better balance, greater strength and rigidity.

Since slots are extruded, supporting bars do not pass through the box. This assures full wiring capacity and also makes wire pulling easier.

The slot feature permits the box to be moved to any position on the bars. It can be locked into position merely by spreading supporting bars.

The hung ceiling box can be used without an extension collar—since the box can be made with the extruded slots at any given height from the bottom of the box.

All sixteen knockouts can be used. The top row of eight knockouts allows conduit to enter box from any angle above the grid structure. The lower row of eight knockouts is for conduit running parallel with the channel.

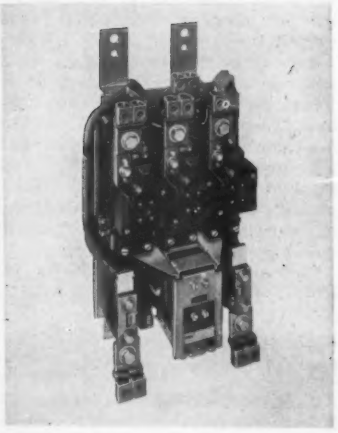
For additional data, ask for item P-1119, using the coupon on page 104.

Size 5 starter requires only 270 inches of space

A COMPACT vertical action Size 5 starter which requires only 270 square inches of space, has been announced by the Square D Co., 4041 N. Richards St., Milwaukee 12, Wis. Easy maintenance and fast wiring are spotlighted in the vertical action Size 5 design.

The coil, contacts and overload relays can be easily changed without disturbing external connections. A screwdriver is all that is needed for these changes.

Up to four extra interlocks can be added in addition to the holding circuit interlock. Push button and selector switch kits are available for



addition to the new Size 5 in general purpose enclosure.

For additional data, ask for item P-1120, using the coupon on page 104.

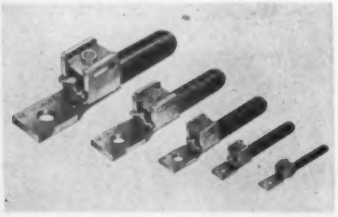
Pressure lugs designed for confined areas

SOCKET TYPE set screws feature the new "wide range" pressure lugs for electrical installations now being marketed by National Electric Products Corp., Gateway Center, Pittsburgh, Pa.

The socket type lugs are especially designed for use in entrance switches, service troughs, panel boards, shallow housings and similarly confined areas where bolt head projections present an installation problem.

Like National Electric's screw and bolt type "wide range" lugs, the new product line is available in five models adaptable to a cable range of 14awg to 500mcm

Socket type pressure lugs match the high quality construction features of the established line and are completely cadmium plated for protec-



tion against corrosion. Each of the lugs is identically designed to provide positive grip action, terminal efficiency and physical dimensions for rapid installation.

For additional data, ask for item P-1121, using the coupon on page 104.

Entrance cap for cable, EMT and rigid conduit

A NEW LINE of service entrance caps that take rigid conduit, EMT, as well as service entrance cable has been developed by The Thomas &

Sherman Lugs

Sherman Solderless SS Type "All-Around" lugs are made in six sizes — #14 to 1000 MCM. Large contact surface for maximum conductivity. Open end barrel assures proper cable installation. Low silhouette — easy to install in tight places. Precision made and corrosion resistant.

Sherman — Known for quality since 1895.

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BATTLE CREEK, MICHIGAN

rail reflectors. In addition, a com-

Ultra-Lites are available in two de-

tric knockouts of ½", ¾", 1", 1¼"

Betts Co., 36 Butler St., Elizabeth, New Jersey.

The first size in the line will accommodate 3 #1/0 service entrance cable and 1½" rigid or thin-wall conduit. Design of the new cap is in line with T&B's development of electrical fittings of greater capacity and versatility to meet the constantly increasing use of electricity. Previous service entrance caps took cable size 3 #2 maximum.

An adaptable saddle feature of the cap permits use of either rigid conduit, thin-wall conduit or service en-

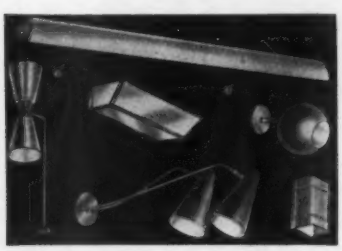
trance cable. When used for service entrance cable, attachment of the entrance cap to the building is simplified by an anchor plate. Fastened in place, the plate receives a mated wedge-shaped section on the back of the cap for a firm hold.

For additional data, ask for item P-1122, using the coupon on page 104.

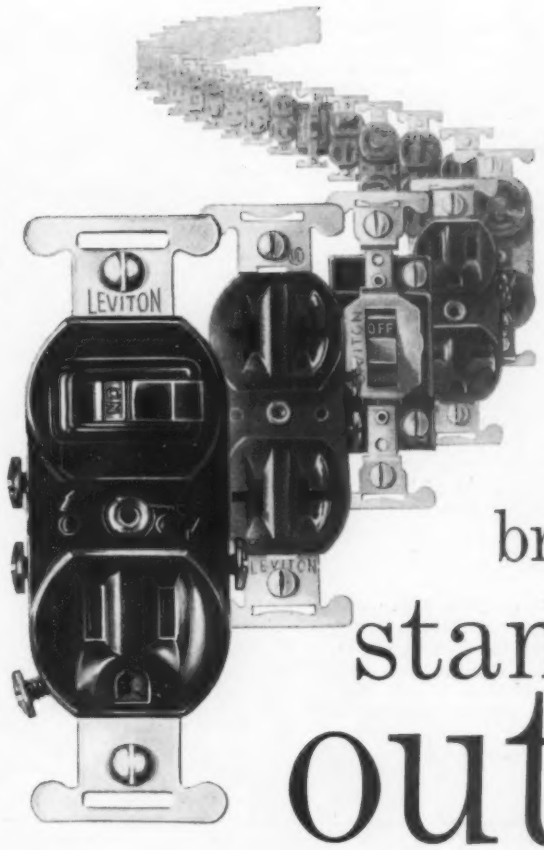
Incandescent and fluorescent store lighting fixtures

AN EXCEPTIONALLY complete line of store lighting fixtures, every model designed to stimulate the selling of merchandise, has been announced by Peerless Electric Co., 575 Folsom, San Francisco, Calif. Featuring a complete array of incandescent and fluorescent designs, factory production is arranged to provide variations of size and mounting in any model as desired for any installation, resulting in the flexibility of custom lighting.

The line includes conical display directors, display cylinders, bowls, spheres, cornice and perimeter fix-



tures, fitting and dressing room models, mirror lights, strips, showcase reflectors, showcase valances and T-



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Switches and Receptacles
for industrial, commercial and residential use

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Quickwire
U-grounding Devices
Interchangeable Devices
Lev-o-Let
Weatherproof Devices

CHECK THESE FEATURES FOR YOURSELF

- Molded of heavily sectioned rugged bakelite.
- Heavy gauge, rust-proofed underslung strap solidly riveted to cover and base.
- Wide break-off plaster ears.
- Large head No. 8 terminal screws staked and backed out to accommodate No. 10 conductors.
- Individually packed with mounting screws attached to strap.
- Switch mechanisms utilize a high grade bronze for wide, double wiping contacts.
- Solidly riveted assembly prevents any loosening.
- Receptacles have double-wiping phosphor bronze contacts.
- Meet UL, C.S.A. and Federal Specifications.

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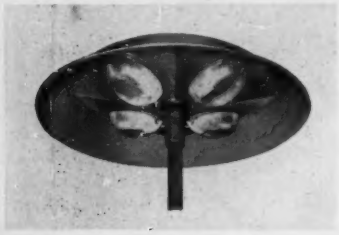
rail reflectors. In addition, a complete assortment of ceiling hangers, wall bracket mounts and counter mounts are available, together with accessories as required.

For additional data, ask for item P-1123, using the coupon on page 104.

Mercury luminaire offers uniform large-area lighting

A MERCURY luminaire called the No. 5442 "Ultra-Lite" is now available for improved high-level, uniform lighting of parking lots, shopping



center plazas, playgrounds, parks, and other sites where horizontal, large-area illumination is needed, from Revere Electric Manufacturing Co., 6009 Broadway, Chicago 50, Ill. Pole requirements are reduced 50 to 75 per cent due to increased lighting coverage of Ultra-Lite design.

Ultra-Lites are available in two designs; the 72" Ultra-Lite with spun aluminum dome and reflectors tilted at 15° for greatest intensity over the widest area, and the 52" Ultra-Lite with vitreous fired porcelain enamel dome in any color, with reflectors on a horizontal plane.

For additional data, ask for item P-1124, using the coupon on page 104.

Two sections added to wiring trough line

TWO SECTIONS, one twenty inches and the other thirty inches long, have been added to the line of 4x4" wiring troughs and fittings available from Wadsworth Electric Mfg. Co., Inc., Covington, Ky. Concentric knockouts, ½", ¾", 1" and 1¼" are ten inches on center. All Wadsworth troughs are full inside dimensions, giving maximum wiring space.

These new sections come equipped with sealable screw on covers and can be used with Wadsworth's complete line of 4" x 4" fittings.

In addition to their 4" x 4" and 6" x 6" section they are coming out with a new 8" x 8" inside dimension in 1-2-3-4 and 5-foot sections, also fittings. All of the sections are less knockouts except the one-foot section which has two sets of concentric knockouts of ½", ¾", 1", 1¼" and ¾", 1", 1¼", 1½" on opposite sides of each other. All of the troughs have screw on covers.

For additional data, ask for item P-1125, using the coupon on page 104.

Weatherproof housing with glass windows

CAST-ALUMINUM weatherproof housing to meet the long-standing need in many instances for easy visual inspection of the housing interiors, has been added to the line of the Adalet Manufacturing Co., 14300 Lorain Ave., Cleveland 11, Ohio.

Adalet has perfected a means of gasketing and fastening clear glass windows in the housing covers to make them absolutely weatherproof. Housings can be supplied with clear plastic windows rather than glass ones.

The hinged-type, cast-aluminum housing illustrated is an enclosure for a refinery installation. The 6" x 6" glass windows allows easy visual access to the ammeter mounted within the housing. The conduit entrances are tapped in padded wall sections that provide a minimum engagement of five threads.

For additional data, ask for item P-1126, using the coupon on page 104.

LOOK—MR. CONTRACTOR

2000 watt Electric Heating Cable
only $8.85 from Your Jobber

WHY PAY MORE?

- UL Approved
- Nylon Jacketed
- Top Quality
- Individually Spooled and Boxed

Other Sizes — 250-5000 Watts Proportionally Priced.

Also THERMOSTATS • STAPLES AND STAPLERS

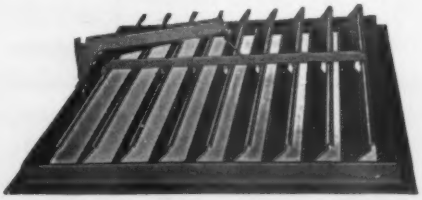
TENNESSEE PLASTICS, INC.

P. O. Box 786
Johnson City, Tenn.

Elgo Ventilating Specialties

A SUPERIOR AUTOMATIC SHUTTER

The most substantially built shutter on the market. The only shutter with an angle-iron frame. Noted for its durability and long life. Used by leading fan and blower manufacturers and by ventilating and air conditioning engineers. Write for new 16-page catalog.



"Echo" Automatic Ceiling Shutters

Used for attic ventilation. Installed in attic floor at the base of a penthouse, the louvers being operated by the suction of the fan.

Free CATALOG

ELGO SHUTTER & MFG. CO.
2738 W. WARREN DETROIT 8, MICH.

Statement of Ownership

STATEMENT required by the Act of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 233) showing the ownership, management, and circulation of Electrical South published monthly at Dalton, Ga., for October 1, 1957.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: publisher, W. R. C. Smith Publishing Co., Atlanta, Ga.; editor Carl W. Evans, Atlanta, Ga.; business manager, Frank P. Bell, Atlanta, Ga.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual member, must be given.) W. R. C. Smith Publishing Company, Atlanta, Ga.; Estate of W. R. C. Smith, Atlanta, Ga.; O. A. Sharpless, Atlanta, Ga.; T. W. McAllister, Orlando, Fla.; W. J. Rooke, Atlanta, Ga.; E. W. O'Brien, Atlanta, Ga.; J. C. Cook, Atlanta, Ga.; R. P. Smith, Atlanta, Ga.; Mrs. E. L. Philpot, Atlanta, Ga.; Mrs. Seba Jones, Atlanta, Ga.; A. F. Roberts, Atlanta, Ga., and Wm. C. Herbert, Atlanta, Ga.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required from daily, weekly, semiweekly, and triweekly newspapers only.) Frank P. Bell, Business Manager.

Sworn to and subscribed before me this 1st day of October, 1957, Seba J. Jones, (My commission expires Feb. 23, 1958).

Speed operation of hydraulic conduit benders, cut installation costs with the new, portable GREENLEE No. 798-AC Hydraulic Power Pump

Here's the improved new, *portable* GREENLEE Hydraulic Power Pump that operates a GREENLEE Hydraulic Conduit Bender *three to five times faster* than a hand pump. Team it up with your conduit benders (either GREENLEE or other makes) and see how much faster and easier your jobs go! Big reason is that this pump has the *exclusive* GREENLEE feature of *two-speed action* for fast approach to the work and automatic change-over to lower speed, *high-pressure* drive . . . eliminates costly waiting time for ram to reach the work. This compact, electric motor-driven pump is capable of developing continuous pressure of 6,000 psi and up to 10,000 psi intermittent. It's a powerful, versatile unit for use on hydraulic conduit benders, knockout punch drivers, and many other hydraulic tools you use in the shop or out on the job. Get complete facts today.

Send Coupon Today

GREENLEE

GREENLEE TOOL CO.
1791 Columbia Ave.
ROCKFORD, ILLINOIS, U.S.A.

Greenlee Tool Co.
1791 Columbia Avenue, Rockford, Illinois

Please send data on the timesaving new GREENLEE No. 798-AC Portable Hydraulic Power Pump.

Name _____

Company _____

Address _____

City and State _____

Economic comment

(Continued from page 5)

survey of two thousand college undergraduates in twenty leading colleges and universities, students were asked whether they understood certain named ideological concepts. The following shows the percentage of respondents who signified that they knew what each of the concepts meant: Democracy, 99.0%; Socialism, 92.0%; Communism, 93.0%; Fascism, 65.0%; People's Capitalism, 46.0%; and Anarchism, 61.0%.

These figures reveal that future generations of leaders must become better acquainted with this concept if it is to continue to have real significance in the future of the economy.

Kentucky utility

(Continued from page 70)

KWH totalizing meters for equipment loading and accounting purposes. Primary circuit loadings are checked when and as required where losses or excessive voltage regulation indicate such need. This is generally done with heater type maximum demands amp meters or by instantaneous clip-on type ammeter readings at peak load conditions. Distribution transformer and secondary load checking is also done mostly as local voltage or service conditions indicate. In addition to the use of meters as on the primary circuits, required changes of transformers and secondaries are also determined by the number of customers, the type of equipment in use or from kwh consumption. Few transformers are equipped with load indicating devices.

Much has been done on the Kentucky Utilities Company system in recent years to improve system operation and reduce operating costs. A partial list may be tabulated as follows:

(1) General program of rehabilitating old circuits and facilities.

(2) Development of standards for construction and maintenance practices and procedures.

(3) Providing more capacity in circuit and equipment specifications for new construction and reconstruction to take care of expected future load growth.

(4) More carefully planned program of equipment maintenance.

(5) Installation of more automatic reclosing equipment on station feeders and rural lines to reduce "burndowns" and service calls.

(6) System coordination of protective devices to prevent unnecessary outages and service calls.

(7) Closer coordination for construction and maintenance of routes jointly-used with other utilities.

(8) Improved program of tree trimming, right-of-way spraying and substation spraying for systematic control of brush and vegetation.

(9) Constant study of local and area load growth to provide adequate service and capacities to added customer equipment.

(10) Full use of micro-wave for communication and switching as well as short-wave radio between service headquarters and vehicles.

Baltimore substations

(Continued from page 50)

stallations are limited to a minimum size of 10 kva.

Routine load and voltage tests of distribution circuits are made on a continuing basis to provide data for adequate system planning as well as to locate areas necessitating voltage improvement. Such a program, by indicating where improvements are desirable, permits system reinforcement before complaints are received. Load testing of transformers is a major factor in keeping to a minimum the number of distribution transformer burn-outs as a result of overload. Prior to peak load periods an office survey is made to determine critically loaded transformers. Load tests made on these transformers then indicate whether replacement is desirable to prevent possible burn-out. New transformers installed are of the self-protecting type which trip from service before thermal damage is sustained.

Our company has under study several distribution system modernizations. A relatively new type lightning protective device, the Cougnard Deioniser, was recently installed on a forty mile 33 kv sub-transmission circuit. This device utilizes a new concept of lightning theory in affording protection

There are PLUS VALUES for YOU in the PAINE line of Hanging and Fastening Devices:

ONE SOURCE. Saves you time, inventory and freight costs.

TOP QUALITY and job-right design make satisfied users.

GOOD PACKAGING — Strong, colorful cartons, clearly labelled.

CUSTOMER DEMAND stimulated with attention-getting ads like this →

ask for PAINE "SUDDEN DEPTH" DRILLS
drill masonry faster and easier
made of finest tool steel with the famous CARBOLOY TIP
New 44° spiral — New wide flute — New narrow land provide a smooth path for
IMPROVED, AUTOMATIC DUST EJECTION
New ¼" shank on ⅜", 7/16" and ½" drills. ½" shanks on sizes from ½" to 1½".
Send for Catalog
THE BEST CRAFTSMEN ALWAYS TAKE PAINE'S

THE PAINE COMPANY, 21 Westgate Road, Addison, Illinois

What good is specialized business publication advertising?

No one **is in a better position to give a hard-boiled, practical answer to this question than the men who spend their working lives on the sales front . . . the men the ads are supposed to help . . . the men who sell.**

Here is the statement of a salesman who knows what advertising does for him when it appears in the industrial, trade or professional publications that serve the specialized market to which he sells:

William F. Mattes, Jr.
Lamp Division
General Electric

Sells retailers

Says Mr. Mattes:

"My selling is mostly with the headquarters offices of chains — variety stores and food stores. Matter of fact, some of these chains, particularly in the variety store field, do not permit salesmen to call on store managers. They prefer to interview sales people at headquarters, and then send out mimeographed letters to their districts and store managers.

"This makes our trade ads doubly important — they have to take the place of salesmen with the individual store manager or department manager; and they add color and pictures and enthusiasm to the letters that are passed down from headquarters.

"In the old days, the idea of trade paper advertising would simply be to say: 'Stock General Electric lamps, they have the best customer preference.' Today the tendency is to be more specific, to show pictures of the product, illustrations of displays, and pertinent merchandising information. For instance, it is a good merchandising service to be able to tell chain retailers the proportionate popularity of different size bulbs, different colors and types, so that the best merchandising effort is made on the fast selling items. Any facts like these in our trade advertising help the chain store managers and so, of course, make our sales effort that much easier and more productive."

"Trade advertising very definitely helped us introduce and sell packaged light bulbs. Half our unit sales come in bulbs in the 25 to 100 watt range. Knowing this, we put these popular sizes in a handy 4-bulb package. Merchandising bulbs in packages was quite a revolutionary idea when we first introduced them ten years ago, and trade advertising was used to help sell the idea to store managers. Of course, some variety stores still sell loose bulbs, but more and more the trend is toward package sales."

Why not **ask your own salesmen what your company's business publication advertising does for them. If their answers are generally favorable you can be sure that your business publication advertising is really helping them sell. If too many answers are negative it could well pay you to review your advertising objectives—and to make sure the publications that carry your advertising are read by the men who must be sold.**

ELECTRICAL SOUTH

One of the 207 members of National Business Publications, Inc. . . . each of which serves a specialized market in a specific industry, trade or profession.

Better installations in less time

Simple, quick to install

BLACKHAWK 540 BOX SUPPORT

stays rigidly in place

The Blackhawk No. 540 one piece box support slips into the wall opening and tabs are bent back to hold it in place. After the switch box is installed, the tabs are bent to the inside of the box squeezing it firmly in place. It's that simple and quick.

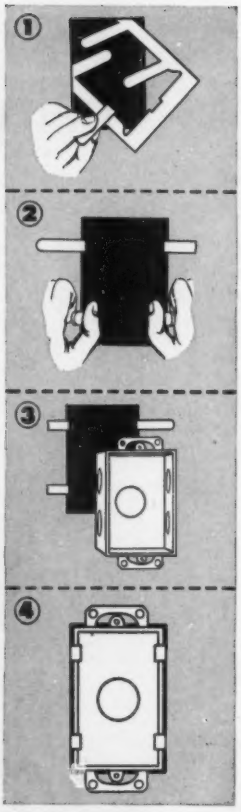
It makes a permanent installation because the Blackhawk 540 box support is a large single piece . . providing rigid, unified support. It does not wiggle or saw because it is parallel to the wall.

For simple, quick, permanent switch box installation, specify Blackhawk No. 540 box support. Ask your electrical distributor for Blackhawk.

Blackhawk Industries

BLACKHAWK INDUSTRIES

DUBUQUE, IOWA



from high voltage surges resulting from atmospheric electrical discharges. Relative merits of this device will be determined when sufficient operating experience has been accumulated. Use of series capacitors to reduce voltage flicker upon starting of large motors is also under consideration. Application of series capacitors appears desirable in rural areas remote to substations.

We are continuing our program of improvement of service reliability to residential customers. Analysis of distribution circuit outage data arranged on IBM cards indicates the areas where improvement in service continuity is desirable. Line and tree conditions are field surveyed in such areas to determine the most suitable improvement. Expanded use of reclosers, aerial cable and Hendrix cable, increased conductor spacings and tree trimming have contributed to an improved service reliability record. We feel that such a program also has economical advantages in the reduction of the number of outages caused by storm thereby minimizing costly emergency repair work.

Duke load growth

(Continued from page 48)

used on distribution circuits to improve quality of service. The secondary and series capacitors which have been installed are for experimental purposes only. New feeders are being designed to accommodate load with a minimum voltage drop within economic limits.

In some commercial areas, improved service is obtained by banking of secondaries. In many other areas, secondaries are so arranged that load adjacent to two transformers can be shifted if necessary. The company is actively promoting an adequate wiring program since the quality of service that a customer ultimately gets is also affected by his interior wiring.

Economics

Much emphasis has been placed on economics in the midst of rising construction and operating costs. A major step in the interest of economics was the construction of a central warehouse. The warehouse supplies the entire Duke service area comprising a 300 mile by 70 mile section of the Piedmont Carolinas, extending from Georgia

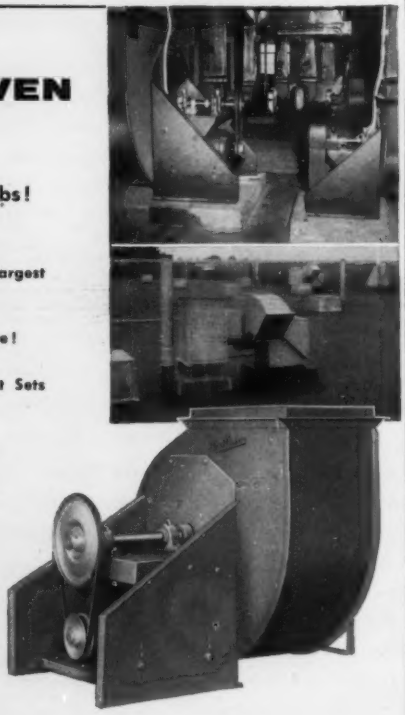
PRACTICAL • PROVEN • POPULAR

for "1001" commercial ventilation jobs!
"BUFFALO" BELTED VENT SETS

- **The same high performance built into the largest "Buffalo" Fans!**
- **Capacities up to 20,000 cfm!**
- **Non-overloading, regardless of system pressure!**
- **Easy "package" installation!**
- **Also, a line of efficient direct-drive Baby Vent Sets for your smaller capacity jobs!**

Top: Real flexibility possible with multiple unit installations.

Center: Outdoor or roof installation, with all-weather drive cover.



WRITE FOR BULLETIN 3720

BUFFALO FORGE COMPANY

210 Mortimer St., Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Sales Representatives in all Principal Cities

INDUSTRIAL EXHAUSTERS BELTED VENT SETS PROPELLER FANS "E" BLOWER-EXHAUSTERS

FOR

transformers in 7.2/12.5 and 14.4/

to Virginia. It has been possible to reduce the overall stock of materials appreciably and to make the stock on hand available to the entire systems. Substantial savings have been effected by re-use of most of the 5 kv class equipment which was removed during conversion. In this way purchases of new 5 kv equipment have been greatly minimized.

Economics have also dictated the use of aluminum conductors instead of copper. Bare ACSR has replaced copper for high voltage feeders, and triplexed or quadruplexed aluminum service cable has replaced copper service cable. Study is being given to standardizing on two or possible three sizes of ACSR conductor.

The pole top pin is replacing the standard cross-arm for single phase construction. New street lights are generally multiple with photoelectric control.

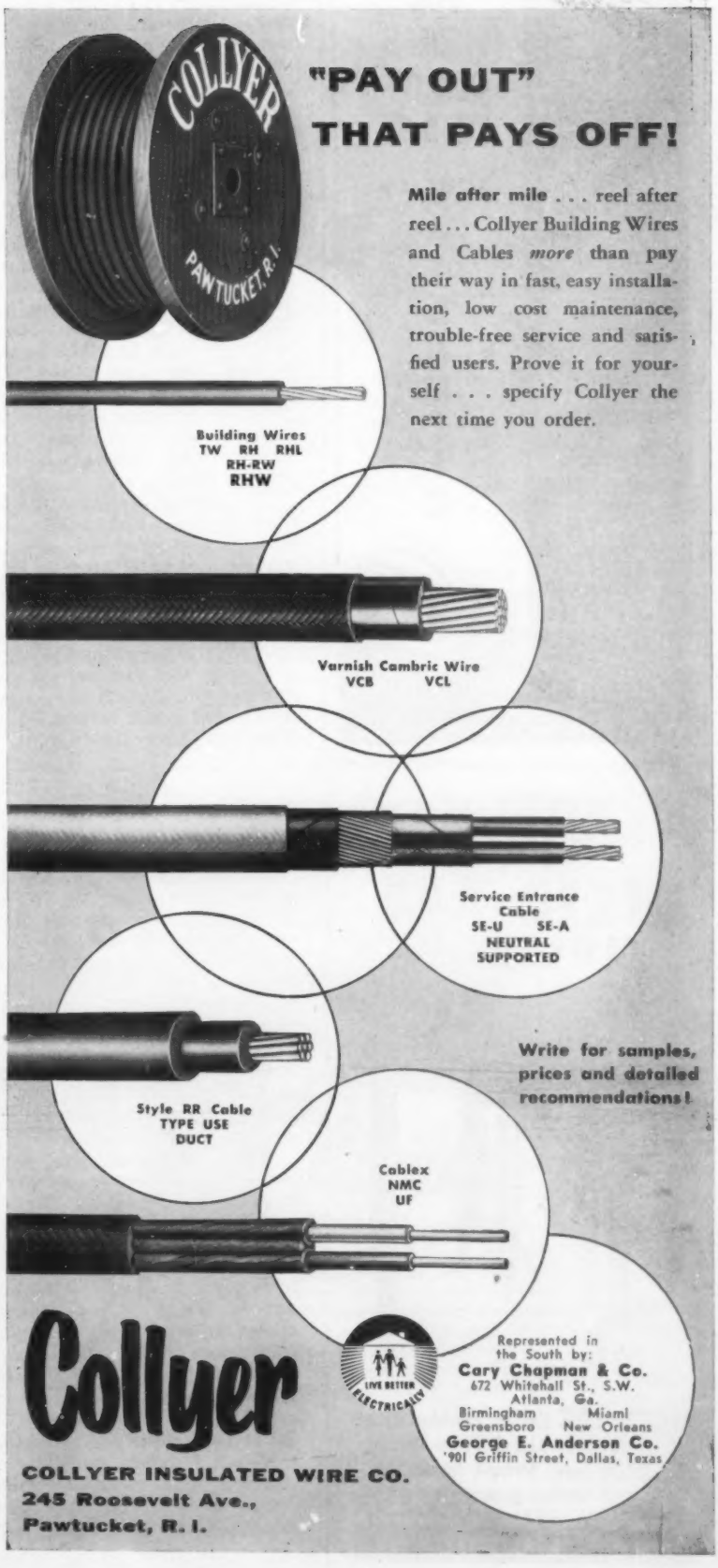
Design and engineering have been centralized with field testing and development to find better methods at lower costs. Service cars and trucks in the operating district are equipped with 2-way radio communication. This has proven of great advantage in conserving manpower for normal work and facilitating emergency repairs.

To further reduce costs, single phase transformers without taps on sizes up to 50 kva are being purchased. Many of the surplus 2.4 kv transformers are rebuilt for 7.2 kv operation and up-rated to as much as 300 per cent of original rating. A valve type arrester with open gap is being installed on the transformer tank.

Substations and transformers

In some of our larger substations, phase reactors are being installed in each feeder to limit fault duty to approximately 100 mva. In substations serving individual customers (300 to 1000 kva), one or more three-phase transformer units are usually installed. Knife disconnects are mounted ahead of a set of liquid power fuses (minimum size 20 amps.) on a pole, and the leads from the power fuses drop directly to transformer bushings. Lightning arresters are mounted on the transformer tank adjacent to the bushings, with the metering equipment mounted on a short pole near secondary terminals. The installation is enclosed by a fence.

Approximately 80 per cent of our single phase, pole-mounted



transformers in 7.2/12.5 and 14.4/-24.9 kv class are the self-protecting type. The red light or secondary breaker tripout, serves as an indication of the loading on the transformer. It has been the practice for a number of years to supply three-phase service up through 150 kva from pole-mounted, three-phase transformers. All new three-phase transformers, 150 kva and under, are generally self-protecting. The 7.2/12.5 kv transformers have a weak link while the 14.4/-24.9 kv transformers do not. Fused 25 kv cutouts are used to protect the three-phase 14.4/24.9 kv transformers. The single phase 7.2 and 14.4 kv self-protecting transformers are equipped with the weak link. No cluster-mounted transformers have been installed to present date.

While much progress has been made in the art of distribution in the last few years, there are still a number of problems to be solved. However, with the continued cooperation of the manufacturers and exchange of ideas among electric utilities, these obstacles can be overcome and further economies made in construction and operation which will result in making electrical living a reality for all.

Estimator program

(Continued from page 19)

For example, and as a sidelight on the firm's estimating efficiency, the Doyle concern is presently at work on a $100,000 wiring job which was landed by the slender margin of $47. "There was only a variation of $1,800 between all the bids on this job," said Doyle, "which is less than two per cent." This he cites as an illustration that where contractors know their business, their bids come mighty close to one another.

"Our own estimates usually range within three per cent of our competitions'," he adds.

Yet Doyle lost by a scant $60 a wiring job that ran $60,000, which he claims only proves it's human to err. As proof of this he points out one occasion when the firm made an error in transposing a $200 figure to a $500 notation.

"If we'd caught this mistake when extending, we'd have landed a $14,000 job by being lowest bidder to the tune of $38," said Doyle.

"What I expect from my estimator is: 'How much is it going to cost me to do the job?' " says Doyle. "Having answered this question for me, the profit percentage we seek is tacked on."

Doyle deplores the practice among some general contractors of exhibiting the electrical contractor's bid to other bidders and asking them: 'Can you beat this?'

"It's poor business to take somebody else's figures," said Doyle, "reduce it by five per cent, then offer the result as you bid for the job. If you take such figures, you're also taking the other fellow's mistakes!"

While there are perhaps as many ways of estimating overhead as there are contractors, Doyle's method is to have an audit made quarterly. "We don't attempt to do cost accounting on every job, since for us it is too expensive. And even an entire year's operation may not reveal actual profit or loss, since material costs may vary ten per cent up or down.

"For example, material on a job may cost $60,000. We buy it and set it aside for the job. It might turn out that $5,000 of the material comes back at job's end. On the other hand, we might have to ship out another $1,000's worth before the contract is completed.

"Efficiency experts say I'm wrong, but I've found that too-frequent accountings of costs is fruitless and impractical. Our quarterly audit reveals what percentage of the gross is our own, and we find our overhead varies from ten to fourteen per cent.

In the first quarter of last year, the Doyle firm had racked up a million-dollar gross, with overhead figured out at seven and one-half per cent. By the year's end, it had jumped to ten per cent. Doyle explains the variation stems from factors like the type of job, location, etc.

An old saw has it that "I'd rather you laugh at my economies than weep at my extravagances." In Doyle's case, this multi-million dollar operator manages to get by with one bookkeeper. She travels between the Tampa and St. Pete offices to perform her dual role. In addition, Doyle points to the fact his office is so systematized, only two girls are required to handle the St. Pete shop.

With this sprawling electrical firm, it is the policy to consider three factors in determining the percentage of profit to be latched to an estimate. In descending order, the trio rank, according to Doyle:

"How bad do we need the job?

KING
RIGID-NOB
CABLE STAPLES

New!

RIGID-NOB Design Provides Raised Driving Knobs — plus A Ridge Member To Assure Easy, Straight Installations
Bright Steel • Stainless Steel • Cadmium Finish
CONTACT OUR LOCAL REPRESENTATIVE
KING MFG. CO. INC., JAFFREY, N.H.

"What supervision will be needed?

"How keen is competition?"

Says Doyle: "If some of our competition has been eliminated for one reason or another, we can boost our profit. If architects are very exacting and we know we'll have to make a 'gold-plated' installation, then our price will be accordingly high. Then of course there is always to be considered the problem of how well we can work with the general contractor on the job.

"Again, competition is invited on some jobs, while on others some competition is excluded under the 'Bids by Invitation Only' phrasing. When architects are wary, they want to make sure that bids will be submitted by capable electrical contractors of established reputation, whereas listings open to everybody may lure incompetent or under-equipped electrical men.

"Since the estimates of such contractors, while away out of line and based on fallacious reasoning or fantastically poor judgment, may be low by comparison with more responsible bidders, architects may fear to pass them up, since they may be loath to thus invite criticism, rebuke or, perhaps, charges of favoritism."

The Doyle firm, assured of the capabilities of the estimators it has trained, will figure any kind of electrical job anywhere in the Southland. Currently a major contract is running at Myrtle Beach, South Carolina.

Doyle sends a key man (superintendent) on every job running in excess of $10,000. A general foreman heads up smaller jobs, and the estimators work very closely with the superintendents on the bigger work. It is their responsibility to integrate their efforts with the super and help him solve whatever problems arise throughout the prosecution of the contract.

Low voltage switchgear

(Continued from page 26)

fourth. The 225-ampere frame size remains essentially the same as that of the previous line. Compartment width, over the entire line, is two inches less than previously.

Breaker weight also has been reduced to provide easier handling and permit the use of fewer personnel when replacements or changes are made in installations. The reduction was made possible by the new design and by use of recently developed light-weight materials with high strength-to-weight ratios.

Weight of the 600-ampere breaker has been reduced 30 per cent. There is a 55 per cent reduction in the weight of the 1600-ampere size. The 225-ampere breaker weighs virtually the same as before.

Standardization

Extensive standardization has been carried out in the new breaker line. While former breakers all looked alike, they were not. Each frame size consisted of more than one hundred major parts — most of which could be used in only one size breaker.

The new line uses six standardized sub-assemblies. Replacement of any new line sub-assembly will be faster than replacement of a corresponding individual part. Thus field servicing will be greatly simplified.

The sub-assembly system also will minimize parts stocking, with attendant inventory problems, and reduce replacement time.

Time required to change over from manual-charging to electrical-charging is greatly reduced — from about one hour with previous breakers to minutes with K-line units.

Closed-door draw-out

The new breakers may be moved to test and disconnect positions without opening the compartment door. This provides maximum cleanliness which is particularly important in dirt-laden atmospheres. It is also a safety protection and keeps aisles clear of compartment doors for the passage of materials handling equipment.

A lift-shutter, which allows insertion of the crank that moves the breaker in and out, can be padlocked in either test or disconnect positions to guarantee complete safety.

The shutter can not be lifted until the breaker is tripped. While the shutter is open, the breaker can not be closed.

The extendable escutcheon slides through the compartment door as the breaker is moved to test and disconnect positions, while a dust

Reach For
Test-Proven
ACCURATE TAPE
FRICTION .... RUBBER .... PLASTIC
Test-proven by International Testing Laboratories, Inc., for bond and tensile strength, climatic extremes, dielectric qualities, and elongation tests. Accurate exceeded all ASTM requirements. Rely on Accurate with confidence—Accurate is the choice of electrical men everywhere. Accurate Plastic Tape is Underwriters' Laboratories approved.
Send today for our most recent bulletin describing details.
ACCURATE MANUFACTURING CO.
GARFIELD, NEW JERSEY

seal, surrounding the escutcheon, is held in place by the door.

Increased accessibility

Accessibility of overcurrent trips has been greatly increased. Where formerly it was practically impossible to adjust or change trips on electrically-operated types without a major effort, trips on the new line are out in the open and easily adjusted.

Trips also can be changed easily. Where trips for individual phases were separately mounted on former breakers, trips for all three phases in the new 225 and 600 ampere breakers are combined on a single molding — one of the six major sub-assemblies comprising the complete breaker.

Trips on the electrically-charged models can be changed in one-fifth the time formerly needed. Time for changing trips on manual units has been cut in half. This quick-change feature is particularly significant in meeting constantly expanding load requirements.

It now is entirely feasible for the user to make his own changes. These trips are changed from the rear, compared to front-servicing on the previous line. Misalignment, during replacing or changing of trips, is now practically impossible. Tripper bars are factory-aligned in special precision jigs.

Trip flexibility

K-line breakers provide a new simplification in the use of trip units. Only nine units are required in the new line, compared to the 23 used in the previous line.

Each trip can be used over a wider range of continuous load conditions. Last minute changes in load capacity can be met, in many instances, with an existing breaker and trip as a result of this new setup of trip settings.

Neatness in workshop

(Continued from page 34)

Plenty of refuse bins stand around to receive what might go on the floor at times.

The shop is by no means fancy. It was planned and built for utility, and to offer some room for future growth. We feel that our program for maintaining as much order and neatness as possible saves manpower and adds to safety.

We extend our "place-for-everything" policy to our six equipped trucks, which serve customers in several states. Saving manpower through a well-defined program of orderliness gives us more profit and saves money for our customers.

Automation

(Continued from page 21)

steel drums.

H. Smith, original founder of the business, called Mr. Cleveland in for maintenance work in 1909, soon after the business was founded. This was the beginning of a working relationship which has grown into a strong bond between our two companies.

During the years that followed, Mr. Smith's business grew. Essential machinery, bought to begin the business, was supplemented by other units added here and there as space and need demanded. Finally, the old facilities became too crowded. Production was half what it should have been, space was not available for additional equipment, and the older units were outmoded.

When a new installation was planned which would double production with only a small addition of personnel, we began working with the present owners of the firm, John and Bernard Smith, during the pre-planning phase. This was where we learned that few experts exist for businesses similar to the one the Smith's operate. Mr. John Smith toured the country and upon his return said, "With all the new equipment on the market, you would think there would be many who could advise a client on the proper setting-up of his equipment."

Thus, the burden of planning the electrical installation fell upon us. Naturally, everybody had different ideas about how the machinery ought to be set up. The manufacturer of the machinery said one thing. We had other ideas. Other opinions were also obtained, and these were thrown into the hopper, too. As a result, we came up with what we considered the best layout for this operation, and our customers are very pleased with the result.

For a customer to place this much confidence in your firm—that he will turn over the problems of design to you to work out, being assured you will do a good job — is the test of your firm's proven interest in the customer. With J. & B. Smith Company, Inc., Cleveland Electric Company has evolved a wonderful team opera-

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tion with 100 percent cooperation between the firm's leaders and ourselves.

As I pointed out earlier, mechanized equipment is predominantly in the picture today, and this was true of the modernization at the cooperage firm. For instance, we installed a modern Wheelabrator — a machine, loaded and unloaded by personnel, that cleaned steel drums and lids automatically. This was strictly mechanical, performing timed operations. controlled by standard electrical controls and mechanical drives.

Our ingenuity was called to a severe test when we installed this machine, for the control panel, shipped intact, was destroyed in transit. We had to completely rebuild it, and there was no diagram available. Here, again, by applying basic electrical theory and experience, the panel was wired correctly.

The only electronic circuit encountered was a small tube timing circuit we encountered on the bake oven. This oven is used to heat freshly-painted steel drums to 450 degrees F. for 15 minutes. The timing circuit was used on the high-fire side, and we did not have great difficulty in finding out how it worked.

With qualified electricians — capable of coping with dozens of new problems on every job, the contractor is in the most advantageous position for getting his share of this new business. His electricians have got to be sure of themselves, well-trained in basic electrical theory, and have years of trouble-shooting experience.

There's another characteristic these men should have. When faced with a business owner asking for impractical circuits, the electrician must be able to advise against them — diplomatically.

On the other hand, when the client (who knows better than anyone how the machinery should operate) suggests an arrangement for wiring he would like, the electrician must be able to evaluate the idea or make intelligent suggestions which can later be verified by a firm's engineering consultant.

Though most of the jobs the contractor faces now and in the near future will not require knowledge of "automated" equipment, he can expect that more and more of his work will require knowledge of electrical timers, cut-off switches, temperature controls, and other basic electrical timing devices, different only in that they have newer, more complicated uses.

Automation is another challenge, not a threat, for the contractor who operates with firms using it; however, the majority of future jobs will come from the hundreds of small plants that are modernizing. The trend in this work is toward mechanized equipment, and for the electrical contractor, this is 'bread and butter' business.

Know the law

(Continued from page 36)

pleted condition and the owner is thereby compelled to hire another contractor at a price exceeding what is due the first contractor, it would be unfair to require the owner to pay the first contractor's material or subcontractor bills.

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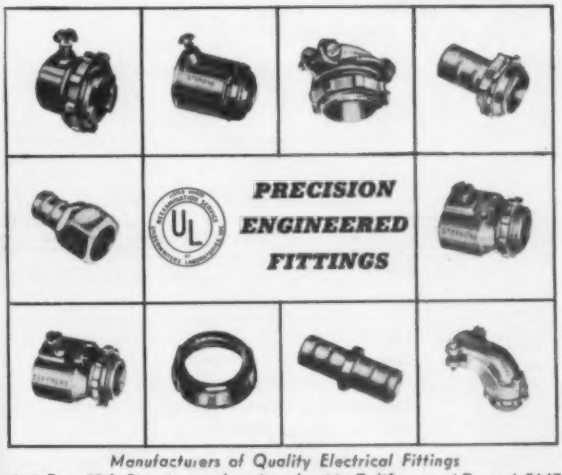

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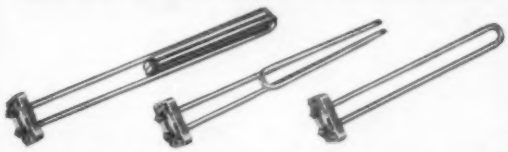

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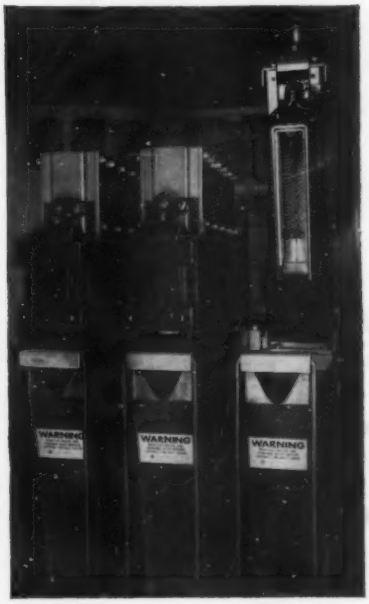

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